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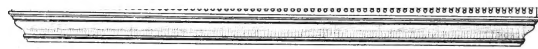
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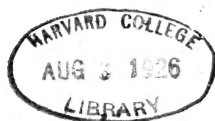


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The
Essex Naturalist:

BEING THE JOURNAL OF THE
ESSEX FIELD CLUB.

EDITED BY PERCY THOMPSON, F.L.S., *Honorary Secretary.*

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DIDYMIUM TRACHYSPORUM.

G. Lister

ON A NEW SPECIES OF DIDYMIUM OCCURRING IN ESSEX.

BY G. LISTER, F.L.S.

(*With one Plate.*)

[Read 25th November, 1922.]

THE subject of this note was first obtained by Mr. James Saunders, A.L.S., in the summer of 1897, when hunting for Mycetozoa in prolific heaps of old straw near Barton, Bedfordshire. The small sessile white sporangia resembled those of *Didymium difforme* Duby, with which they were often associated, but even in the field they could be generally distinguished by the external crust of lime-crystals being not quite so smooth and egg-shell-like as in the latter species; when examined microscopically the spores were found to be rough with scattered spines, not smooth or marked only with a low branching ridge, as in *D. difforme*.

In the same straw heap the fragile top-shaped sporangia of *Didymium vaccinum* (Dur. & Mont.) Buchet¹ were also abundant, a species then new to us; so similar are the two forms in some respects, it seemed possible that the smaller sessile form might be a variety of *D. vaccinum*. Experience has shown, however, that this is not the case; the sessile form proves to be a widely distributed and constant species, retaining its characters in a number of different habitats. I propose to name it *Didymium trachysporum*, in reference to the rough spores. It has been obtained from the following localities:—from near Luton, Bedfordshire, on old straw, by Mr. Saunders in 1906; from Lesmoir, Aberdeenshire, on dead grass, by the Rev. W. Cran, in 1913; repeatedly, in cultures, on old pellets of rabbit and deer, and old bean stalks, Berlin, by Dr. Jahn; from near Vienna, also on deer-pellets, by Christian Lippert, in about 1895, and from Pornic, Loire Inférieure, on old straw, by M. S. Buchet, in 1912. In the summer of 1917 it was abundant on old straw manure in our garden at Leytonstone, Essex, and also on straw near Theydon Bois. During the present summer and autumn the Rev. P. J.

¹ This name replaces *Didymium Trochus* Lister, M. Samuel Buchet having found that the specimen from Algeria, on old *Opuntia* stem, described as *Diderma vaccinum* Durieu Montagne (published in *Exploration Scientifique de l'Algérie*, 1846, p. 407 (22 bis, fig. 1 a to h)) is the same species; the specific name *Trochus* is thus antedated; M. Buchet has published the combination *Didymium vaccinum* in *Bulletin de la Société Mycologique de France*, xxxvi., p. 110 (1920).

Alexander has gathered it repeatedly on dead elm leaves in the grounds of St. George's College, Weybridge, Surrey.

When the Leytonstone growth was in vigour, some of the straw was brought indoors and kept moist under a piece of wet pasteboard ; a month later a number of sporangia, some very minute, others forming long slender or ring-shaped plasmodiocarps, had formed on the under surface of the pasteboard ; all the spores examined had the characteristic rough markings.

The following is a description of *Didymium trachysporum* :— Plasmodium colourless ; sporangia more or less scattered, sessile, white or cream coloured, either hemispherical, 0.2 to 0.6 mm. diam., or forming slender curved simple or branched plasmodiocarps ; the outer sporangium-wall a smooth and egg-shell-like or wrinkled crust of closely compacted crystals of carbonate of lime ; the inner wall membraneous, colourless ; the floor of the sporangium pale yellow, membraneous with a thickened margin, usually containing scanty deposits of lime-crystals, occasionally these are sufficiently abundant to form a small convex columella ; capillitium rather scanty, variable in character even in adjacent sporangia, consisting of threads which are either colourless or dark, stout or slender, nearly simple or branched and anastomosing, sometimes expanded to form vesicles containing lime-crystals : spores clear brownish-purple, 9 to 10 μ diameter, marked with short spines which are either scattered or grouped in clusters, rarely marked with an imperfect reticulation ; the spore-wall is often traversed by a low ridge.

The present species shows affinity with several other members of the genus. *D. quitense* Torrend, of which only two specimens have been recorded, from Ecuador and from Colorado, resembles *L. trachysporum* in general appearance, but has large and very dark brown spores 13 to 14 μ diam., marked with a close imperfect reticulation. From *D. vaccinum* the new species is distinguished by the sessile and often depressed character of the sporangia, whose external crust breaks away in fragments, instead of falling away as a whole, and also by the absence of a prominent columella. From *D. dubium* Rost. it differs in the sporangia not being solitary, in the more scanty capillitium threads which are often stouter at the base, and in the rougher spores. From sessile forms of the protean species *D. squamulo*-

sum Fr. it may be distinguished by the absence of columella and the more spinose spores.

DESCRIPTION OF THE PLATE.

a, *Didymium trachysporum* n. sp. on fragment of elm leaf from Weybridge, Surrey. *b*, a smooth sporangium and a plasmodiocarp with wrinkled wall (enlarged from *a*) ; *c*, smooth sporangia on straw from Leytonstone, Essex ; *d*, *e*, *f*, *g*, various forms of capillitium and lime crystals ; in *f*, expansions containing lime crystals are shown ; *h*, spores.

BIRD PELLETS AND THEIR EVIDENCE AS TO THE FOOD OF BIRDS.

BY PERCY THOMPSON, F.L.S.

[Read 25th November, 1922]

IT is common knowledge among ornithologists that certain birds have the constant habit of casting up, by way of the mouth, the indigestible portions of their food in the form of more or less agglutinated ovoid masses known as "pellets" or "castings." These "pellets," containing as they do only the harder portions of the food which have resisted the solvent action of the digestive juices of the bird, still present their contents in recognisable form, and so afford valuable evidence as to the nature of the bird's ordinary food, evidence which would be entirely lost in the fæces. This habit has not escaped the notice of some of our national poets. Thus, as Mr. J. E. Harting has pointed out¹, Shakespeare, ever quick to use a nature simile, makes Macbeth say at the apparition of Banquo's Ghost:—

If charnel-houses and our graves must send
Those that we bury back, our monuments
Shall be the maws of kites.²

showing that the poet was acquainted with the habit in the case of the Kite, in his day a common scavenger of London streets.

Tennyson, another keen observer of natural things, in a charming passage explicitly refers to this habit in the case of raptorial birds. Picturing the decay and desolation of a great estate whose heiress meets with an untimely death, he says :

And where the two contrived their daughter's good
*Lies the hawk's cast.*³

¹ *The Ornithology of Shakespeare*, 1871, p. 46.

² Macbeth, Act. III. Sc. 4.

³ "Aylmer's Field."

The throwing-up of "pellets" is advantageous to those birds which practise the habit, since they are by this means spared certain internal complications from which other less-fortunate animals suffer.

Thus, the Persian Goat not uncommonly forms concretionary masses in its intestine from the non-digestible food, which are known as "bezoar-stones"; and similar concretions have been met with, as abnormal products, in the intestines of various deer, antelopes and monkeys, and are regarded in the East as possessing medicinal qualities; while in the crayfish a pair of limy concretions are normally formed in the gizzard, and are credited by German peasants with magical properties. The perfume "ambergris" is a faecal concretion formed in the intestine of the sperm whale, and contains fragments of the hard parts of the cuttle-fishes upon which the whale feeds. Various herbivorous animals, too, form what are known as "hair-balls" in their intestines.

These are more or less pathological manifestations, mentioned here only to show the need which many and diverse creatures experience to get rid of the non-assimilable residue of their food, a need which birds have so admirably met by the habit of regurgitation. Somebody has well said that vomiting comes easy to birds, the wide gape, the short distensible œsophagus and the strongly muscular crop which they possess, rendering the process an easy one.

But not birds alone, though chiefly they, possess the pellet-casting method of ridding themselves of the indigestible residue of their food; other classes of animals, at least occasionally, exhibit the same habit. Certain reptiles and amphibians, for instance, eject "pellets." It is recorded of Natterjack Toads that "when captured and placed in a box they vomit pellets of wing cases and the indigestible parts of the harder beetles."⁴ The Rattlesnake is similarly credited. An observer records, "Another strange observation was that sometimes these snakes disgorge pellets composed of hairs and feathers, after the manner of owls,"⁵ and a Leopard Snake (*Coluber leopardinus*), kept in captivity for a year, exhibited the same method of getting rid of indigestible food. "Its last meal, which consisted of two mice, it disgorged about five days afterwards."⁶

⁴ *Zoologist*, 1914, p. 388.

⁵ *Bulletin de la Société Zool. de France*, 1897, p. 187. *Zoologist*, 1898, p. 93.

⁶ *Zoologist*, 1901, p. 159.

Even among invertebrate animals it would seem that the pellet-casting habit is not entirely unknown. That most careful observer, Henri Fabre, in his account of the Garden Spiders, describes the feeding methods of a species of *Epeira* (*E. fasciata*), which he had watched overnight engaged in sucking the body-juices of a captured locust, in these words: "Next morning the spider is still at table. I take away her dish. Naught remains of the locust but his skin, hardly altered in shape, but utterly drained and perforated in several places. The method, therefore, was changed during the night. To extract the non-fluent residue, the viscera and muscles, the stiff cuticle had to be tapped here, there and elsewhere, after which the tattered husk, placed bodily in the press of the mandibles, would have been chewed and finally reduced to a *pill, which the sated spider throws up*. This would have been the end of the victim, had I not taken it away before the time."

In the case of birds, few observers seem to be able to afford any definite information as to which birds, or how many, possess this habit. When, some three years ago, I made enquiry of ornithological acquaintances (some of them first-class authorities in bird-lore) on this point, the replies showed that comparatively little first hand observation had been made in this regard; it was generally known that birds of prey possessed this enviable faculty of avoiding attacks of indigestion, and that it was shared also by such birds as rooks, shrikes, herons and gulls: but the authorities questioned appeared scarcely to be aware how considerable a proportion of birds is accustomed to get rid of non-assimilable portions of food in this way.

As a matter of fact, a large number of birds, of very diverse orders, cast up pellets. It is almost certain that all birds which, regularly or occasionally, swallow indigestible matters, such as the husks of plant seeds, the hard parts of insects, the bones of fish or birds, and the bones and fur of mammals, are compelled to adopt this method of getting rid of such matters.

The food of birds necessarily varies considerably at different seasons, or is dependent upon chance conditions, consequently pellets will be more likely to be produced at seasons when the food includes indigestible substances; for example, Rooks in spring eat the roots of twitch-grass and newly sown oats, the remains of which appear in their numerous castings at

that season ; at other seasons their pellets are apparently infrequent.

Reference to the literature of the subject proves that no exhaustive treatise on pellet production by birds has been written in this country : the records of individual species of birds which throw up castings, though numerous, are scattered through ornithological literature, and often receive but a casual mention as though of inferior importance. Yet surely the exact knowledge of what our feathered friends eat should be of interest to us as naturalists as it certainly is to themselves ; and such knowledge becomes of economic importance when we seek to determine whether a given species of bird is beneficial, or inimical, to our own human interests as agriculturists, as fruit-growers, as poultry-breeders or as game-preservers. It has, therefore, been thought desirable to bring together these scattered records of pellet casting for the better information of students of bird-life. At the same time I take the opportunity of incorporating the results of some slight research in the dissection of " pellets " and determination of their contents, carried out in the Club's Museum, with a view to rendering the information upon the subject more complete. The material which has furnished the facts hereinafter given is preserved in the Club's Museum at Stratford, where it will be available for study by ornithologists.

I find that records exist (or are now supplied) of pellet-casting in some 70 different birds, including no less than 62 British species. Of this total, 23 birds have actually been seen to eject pellets, or else a pellet ready for ejection has been found in the gizzard ; in the case of 29 others pellets have been found around, beneath or actually in the nest or roost or at the feeding-place ; in 8 other cases pellets have been picked up away from the nest, and ascribed with more or less certainty to definite birds ; while in yet 10 others the statement is made that certain birds cast pellets, but no evidence is adduced in support of the assertion. These may be tabulated as follows :—

A. Birds seen to eject pellets, or pellet found in gizzard :—

Redbreast	Merlin
Red-backed Shrike	Kestrel
Spotted Flycatcher	Shag
Rook	Purple Heron
Kingfisher	Common Bittern

Barn Owl	Herring Gull
Tawny Owl	Lesser Black-backed Gull
Snowy Owl	Great Crested Grebe
Common Buzzard	Red-necked Grebe
Sparrow-hawk	Slavonian Grebe
Peregrine Falcon	Eared Grebe
Hobby	

B. Birds whose pellets have been found around, beneath, or in the nest or nesting-place or the roosting or feeding place :—

Dipper	White-tailed Eagle
Great Grey Shrike	Kite
Chough	Lesser Kestrel
Magpie	Cormorant
Jackdaw	Heron
Raven	Ring-dove
Nightjar	Curlew
<i>Halcyon fuscicapilla</i> (a South African Kingfisher)	Black-headed Gull
Belted Kingfisher	Common Gull
Bee-eater	Great Black-backed Gull
Long-eared Owl	<i>Larus dominicanus</i> (a New Zealand Gull)
Short-eared Owl	Glaucous Gull
Little Owl	Ivory Gull
Eagle-Owl	Great Skua
Spotted Eagle-Owl (of South Africa)	

C. Birds whose reputed pellets have been picked up :—

Missel Thrush	Mottled Wood-Owl
Carriion-Crow	Spotted Owlet
<i>Halcyon vagans</i> (a New Zealand Kingfisher)	Domestic Goose
Southern Little Owl (of Egypt)	Chinese Goose

D. Birds stated [without corroborative evidence] to produce pellets. :—

Song Thrush and "all the Thrushes"	Alpine Swift
Swallow	Needle-tailed Swift
House Martin	Cuckoo
Starling	Tengmalm's Owl
Swift	Golden Eagle

I propose in the following pages to summarise the known facts with regard to each of the above birds, but the list given must not be regarded as by any means complete.

It is to be believed that many birds besides those mentioned possess the pellet-casting habit, but definite records are wanting. It is somewhat remarkable that, whilst scores of repeated observations in this regard have been made on a few

of the commoner species of hawks, owls and gulls, so few records have been made in the case of the generality of birds. Yet, as already remarked, it is almost certain that *all* birds which include indigestible matter in their normal food must, almost of necessity, share the convenient habit of regurgitating such indigestible matter.

MISSEL THRUSH.

Mr. W. H. Hudson describes, as though from personal observation, how these birds gorge upon yew berries. He says:—“When a bird, with incredible greediness, has gorged to repletion he flies down to a spot where there is a nice green turf and disgorges, then, relieved, he goes back with a light heart to gorge again, and then again. The result is that every patch or strip of green turf among or near the trees is thickly sprinkled over with little masses or blobs of disgorged fruit, bright pinky red in colour, looking like strawberries scattered about the ground and crushed by passing feet. In a single blob or pellet I have counted as many as 23 whole berries, as bright red as when on the tree, embedded in a mass of viscid pulp, mixed with many of the dark green and poisonous stones of the half-digested berries.”⁷

SONG THRUSH.

The Rev. E. Adrian Woodruffe-Peacock, F.L.S., advises collectors of chalcids to look for them in the nuts of hawthorn, “or from the cleaned stones of the gizzard-regurgitated seeds left by the song-thrushes at their drinking-places.”⁸

REDBREAST.

Miss G. Lister, F.L.S., tells me that she has watched a Robin hop through an open garden doorway on to the carpet of a room where cake-crumbs were scattered: it paused, and, before eating the crumbs, was seen to eject a pellet. The pellet was globular, about the size of a pea, and contained the “rings of a millipede.”

Mr. Oldham records that “remains of fruit (raspberries and currants) were found in pellets ejected by a robin.”⁹

Specimens of Robins' pellets are in the Essex Museum at Stratford. Their contents were found to include a raspberry seed, some fragmentary beetle remains, and grass fragments.

⁷ *Nature in Downland*, 1906, p. 228.

⁸ *NATURALIST*, 1919, p. 329.

⁹ Quoted in Witherby's *Practical Handbook of British Birds*, 1920, p. 483.

DIPPER.

Mr. Bartlett, the then Superintendent of the Zoological Society's Gardens, writing in 1878, has put on record that some six juvenile Dippers in the Gardens were so tame as to come regularly to be fed by hand ; he noticed that they threw up pellets of the indigestible parts of their insect food.¹⁰

GREAT GREY SHRIKE.

A writer says of this bird :—" In summer it contents itself principally with insects (especially beetles and grasshoppers), small frogs, lizards, and blindworms. This is proved by an examination of the pellets which they cast up. In winter, on the contrary, these consist chiefly of the hair and bones of mice and the feathers of birds."¹¹

Messrs. N. F. Ticehurst, M.B.O.U., and C. B. Ticehurst record :—" Under the tree in which the nest was situated we picked up several pellets, which chiefly consisted of the remains of beetles and moths."¹²

Mr. Howard Saunders adds his testimony : " The food consists largely of lizards, mice, shrews, small or young birds, frogs and insects, especially beetles and grasshoppers ; the indigestible portions being thrown up in pellets."¹³

RED-BACKED SHRIKE.

Mr. J. H. Owen has watched this bird cast pellets. He gives a graphic account : " There are many parts of beetles, bees, blue-bottles, etc., which are impossible for a nestling to digest. These parts are thrown up in the form of pellets and are often of amazing size compared with the bird that throws them up. When the nestling is young it cannot eject such a pellet and the old bird has to lift it out of the gape. It then carries it away and drops it, usually after it has perched on one of its favourite alighting spots. Both cock and hen . . . remove pellets. . . . I have watched both old birds throw up pellets just like the young."¹⁴

Mr. T. Holme records : " Their castings, formed of the elytra

¹⁰ Quoted in *Zoologist*, 1878, p. 293.

¹¹ Naumann, quoted in Seebohm's *British Birds*, 1883, p. 600.

¹² *Zoologist*, 1902, p. 272.

¹³ *British Birds*, 1889, p. 140.

¹⁴ *British Birds*, 1916-17, pp. 176 and 180.

and other hard parts of Coleoptera, are found in abundance about their haunts."¹⁵

Examples of pellets of the Red-backed Shrike are in the Essex Museum collection at Stratford: they contain remains of ground beetles (*Pterostichus*, sp. and *Harpalus*, sp.).

SPOTTED FLYCATCHER.

Pellets were found under a nest of this bird in Regent's Park,¹⁶ and were likened to "blue pills." Mr. E. W. Harcourt records that, while watching a Spotted Flycatcher, he noticed that it looked somewhat uncomfortable, with its feathers ruffled and its neck extended. "In a minute or two it rejected from its mouth a pellet about the size of a horsebean, and then hopped away apparently much relieved. Upon my picking up the pellet I found it to be composed of a mass of beetles' wings and other entomological curiosities."¹⁷

SWALLOW.

Yarrell states that this bird shares the habit of throwing up pellets.¹⁸

HOUSE MARTIN.

Seeböhm tells us: "The food of the Martin is composed entirely of insects; and the refuse of this food, such as wing-cases, etc., is cast up in the form of pellets."¹⁹

CHOUGH.

Mr. George Bolam, in his "Wild Life in Wales,"²⁰ remarks: "A person who claimed to have a special acquaintance with the bird in North Wales informed me that he could recognise almost with certainty a cliff inhabited by Choughs from the castings left about the top of the rock, and which, he said, always contained numerous fragments of beetles."

An observer, writing in the *Zoologist*, states: "Castings lying on the ground showed that the birds had been eating barley already."²¹

MAGPIE.

Mr. C. J. Cox, in 1864, found numerous castings under a

¹⁵ *Zoologist*, 1845, p. 1136.

¹⁶ *Zoologist*, 1876, p. 5042.

¹⁷ *Ibid.*, 1889, p. 265.

¹⁸ Yarrell, 4th edn., I., p. 59.

¹⁹ *History of British Birds*, 1884, p. 183.

²⁰ *Wild Life in Wales*, 1913, p. 193.

²¹ *Zoologist*, 1910, p. 48.

magpie's nest, composed almost entirely of the elytra of small beetles.²²

JACKDAW.

Specimens of castings of this bird are in the Essex Museum, and consist of plant-fibres, oat-husks and grass-stems.

RAVEN.

Mr. George Bolam gives an interesting account of his dissection of pellets of the Raven, which I quote in full. He says :

"With a view to obtaining accurate data upon the food of the Raven, I took the trouble to examine closely a considerable number of the pellets, by which these birds, like their relatives, get rid of the indigestible portions of their food. These were picked up, from time to time, beneath roosting or nesting places, and besides showing how little comes amiss to such birds as food, and the manner in which it varies with the season of the year, give some indication of the distances that are daily travelled for it. The sea is roughly about twenty miles from Llanuwchllyn [Merioneth] yet at all seasons some pellets showed traces of food obtained on the shore. Of this, fragments of the shells of mussels, and crabs, were the most frequent, with occasional bits of clam and other shell fish. Bones of fish, bits of sea-weed, etc., also commonly occurred, as well as round, water-worn pebbles, that were, no doubt, from the sea-beach. More frequently, however, any stones found in the pellets consisted of bits of glassy quartz, such as might be picked up about the mountain tops. These must either be swallowed inadvertently, sticking to other food, or (as I think more probable) from the same curiosity as prompts a tame bird to steal any glittering object. Grass, leaves of trees and similar vegetable matter are, no doubt, taken adhering to other food. In summer skulls of voles, mice and rats were very numerous, particularly the first named, these animals being, no doubt, captured upon the hills. Moles, too, were frequent, about equally so throughout the year, many of them, also, doubtless the result of independent capture, though others, perhaps, may have been killed in traps and flung aside. Fur and bones of rabbits were fairly numerous at all seasons, as was also the wool of sheep, and sometimes the hair of cattle and dogs ; but what interested me most was the infrequency with which egg-shells, feathers, or other remains of birds, occurred. Of egg-shells I could never, save once, detect a single trace, and of the pellets examined not above ten per cent. contained any bird remains, at any season, while they were always most frequent in winter. Grouse feathers were naturally the most prevalent, since that was the most likely bird to be found dead, or wounded, about the moors : immature Starlings were almost the only other bird identified, and occurred most often in autumn (? from the capture of young birds, when crossing the moors, or from the picking up of the remains of hawks' meals), once or twice a few feathers of duck, or sea-fowl, were noticed, and twice the skull of a small finch. During summer numbers of beetle wing-cases were nearly always present ; and that no fewer than thirty-one of the pellets, details of which are given below, picked up in the depth of winter, when beetles are largely hidden from view, should have contained such remains, seems to point to those insects forming a more favourite

²² *Zoologist*, 1864, p. 8953.

food of Ravens than might have been suspected. . . . Below is given a detailed result of an analysis of 433 separate pellets collected at random from amongst a mass of those lying beneath a roosting-place of Ravens, near Llanuwchllyn, and brought home for inspection during the last days of December.

" Fifty-one were composed of wool only, or wool mixed with other obvious remains of sheep ; 119 contained wool mixed with bones, hair, and other substances, not apparently belonging to sheep ; 28 contained hair and remains of cattle ; 1, hair, probably of a dog ; 37 remains of rabbit ; 48, remains of rat ; 49, or, perhaps more, remains of mice, or voles, chiefly the latter ; 54, moles ; 3, shrews ; 1, the skull of a water-shrew ; 2, hedgehogs ; 2, stoat or weasel ; 2, fish scales and bones, in one of them the scales being very large ; 25, remains of birds, frequently only a feather or two, but in one case, apparently, nothing but the remains of grouse, probably of almost an entire bird ; 47, shells, and other seashore subjects—crabs, bits of sponge, sea-weed, etc. ; 31, elytra and other remains of beetles, in some instances in large numbers ; 1, the cocoon of a moth—an oak-egger ; 1, fragments of shell which appeared to have belonged to a domestic fowl's egg ; 17, husks of oats ; 4, husks of wheat ; 17, of beech mast ; 26, of acorns ; 2, of sycamore seeds ; 27, various small seeds not identified with certainty ; 1, a cherry stone ; 1, parts of the shell of a hazel nut ; 2, cones or seeds of pine tree ; 13, leaves or ' needles ' of same ; 49, cotyledons, or buds of trees—oak, beech, alder, pine, etc. ; 30, grass, moss, fern leaves, bits of stick, etc. ; 17, pieces of stone, lime, chalk (in one instance), cinder, etc., but by far the most common of such mineral substances were bits of white quartz, in one or two cases in glassy, crystalline form. Amongst the 47 containing matter obviously brought from the seashore, were 11 that included fragments of the shells of sea-urchins, and one that contained a piece of coralline zoophyte."²³

J. H. Salter found a pellet of this omnivorous bird to be composed of wool, and to contain a lamb's hoof.²⁴

Specimens of pellets of Raven in the Essex Museum are of very varied composition, and contain broken mammalian bones, wool and fur, grass and plant fibres, and moss.

CARRION CROW.

Miss G. Lister found numbers of pellets of Carrion Crow in the Jura, composed of cherrystones, with a few beetle remains ; one pellet contained, in addition, fur and bones of mouse.²⁵

A pellet in the Essex Museum, believed to be from this bird, contains oat-husks, crab remains, and a fragment of beetle—a mixed diet !

ROOK.

Rooks' pellets are of very frequent occurrence beneath the nesting-trees, and captive birds have been seen to throw them up.

²³ *Wild Life in Wales*, 1913, p. 222.

²⁴ *Zoologist*, 1895, p. 139.

²⁵ *ESSEX NATURALIST*, xvi., p. 120.

Pellets picked up beneath tall trees are usually flattened by the impact with the soil, or even shattered from the fall.

Their contents are varied, and include root-cuticles of Couch Grass, husks of oats, small snail shells (*Helix aspersa* and *Pupa secale*), remains of centipedes and weevils, etc., generally accompanied by small fragments of brick, stone, chalk or grit.

More curious constituents of rooks' pellets, which several observers have remarked, are indiarubber rings from ginger-beer bottles and indiarubber bands. Whether these articles are actually swallowed by the Rooks on account of their supposed food-value, or merely collected by them because of the attraction of their bright red colour, is a doubtful point. Specimens of these strange constituents in the Essex Museum, from Wanstead Park, were picked up beneath the nests, but were not actually contained in the pellets. The pellets themselves contain plant fibres, oat-husks, elytra and femora of beetles, a wire-worm, and remains of woodlice, mixed with fragments of brick, chalk and stone. One pellet sent me by Mr. J. H. Owen, from Felsted, contains fragments of eggshell of a hen.²⁶

SWIFT.

Seebohm records that "the indigestible portions of the food, such as wing-cases, etc., are cast up in pellets, and the nests often contain a great many of them."²⁷

Howard Saunders says: "Insects taken on the wing form the food, and the indigestible portions are rejected in the shape of pellets."²⁸

ALPINE SWIFT.

Seebohm records that "all the hard parts of its food, such as the wing-cases of beetles, are cast up again in the form of pellets, as is the case with many insectivorous birds."²⁹

NEEDLE-TAILED SWIFT.

Again Seebohm is our informant. He says: "The food of the Needle-tailed Swift is composed entirely of insects of different kinds, the indigestible parts of which are cast up in pellets."³⁰

²⁶ Cf. *Zoologist*, 1894, p. 67; *ibid.*, 1866, p. 297. *Birds of Essex*, p. 135. *Glasgow Naturalist*, 1910, pp. 130-1. *Land and Water*, March 6, 1919. *ESSEX NATURALIST*, xvi., p. 119. *Zoologist*, 1854, p. 4330. Dresser's *Birds of Europe*, art. Rook, p. 6.

²⁷ *History of British Birds*, 1884, p. 296.

²⁸ *British Birds*, 1889, p. 252.

²⁹ *History of British Birds*, 1884, p. 299.

³⁰ *History of British Birds*, 1884, p. 305.

NIGHTJAR.

Seeböhm records that this bird casts up in the form of pellets the refuse of its food, which consists exclusively of insects such as moths and night flying beetles."³¹

Our member, Mr. F. J. Stubbs, has often found castings of the Nightjar. He reports (*in litt.* Nov. 20, 1922) as follows :— " I well remember a small dead prostrate branch in the Forest at Theydon Bois that was used as a roost by a nightjar. I often found accumulations of the pellets, and I tried occasionally to find out the nature of the food, Nearly all those I examined were remains of lepidoptera, especially the scales. Pellets from other districts have had the remains of beetles, and other insects. I have questioned two experienced observers. Both of these have actually collected Nightjar pellets, and have often noticed them, especially at the ' nests.' The pellets are grey and small, oval, perhaps half an inch by three-eighths."

KINGFISHER.

There is now a general consensus of opinion among ornithologists that this bird throws up pellets of its food, consisting largely of fish-bones, out of which accumulation in its nest-hole a bed or nest is made for the reception of its eggs. The pellets are very fragile, and require to be treated with gelatine before they can be safely handled. A writer in *The Field*³² saw a pellet actually ejected. He reports : " I observed that before taking its prey, the bird cast up a small white pellet composed of small fish-bones, which crumbled to pieces when touched." Another observer, who kept a young kingfisher in confinement and so had abundant opportunity for observation of his captive, says : " The castings or pellets cast up by the kingfisher vary considerably ; some are pure white, and remind one of very fine crystals, and others are different shades of drab or grey ; they are composed, I believe, entirely of fish-bones, and are about half-an-inch long, and oval ; I believe they are cast up at different times of the day, and the average number produced is about one per day."³³

Miss G. Lister informs me that she has received pellets of the kingfisher, found close to a favourite fishing-perch of the bird

³¹ *History of British Birds*, 1884, p. 312.

³² Quoted in the *Zoologist*, 1864, p. 9361.

³³ *Zoologist*, 1876, p. 5022.

on the banks of the Thames, and these were so fragile as to require the infiltration of colloid matter to prevent their crumbling. One such pellet is in the Essex Museum at Stratford, and consists exclusively of fish-bones and scales.

HALCYON VAGANS.

This New Zealand kingfisher throws pellets. Mr. T. H. Potts, F.L.S., collected specimens of the castings and deposited them in a local museum.³⁴

HALCYON FUSCICAPILLA.

An examination of the nesting hole of this South African species of kingfisher, in a river-bank, showed it to contain "pellets of fish and insect bones."³⁵

BELTED KINGFISHER.

Seeböhm is the authority for the statement that this bird casts pellets, which often occur in great numbers in its nest-hole. The food comprises small fish, crabs, lizards, and also mice.³⁶

BEE-EATER.

Seeböhm visited a breeding-colony of Bee-eaters on the Danube banks and records that he found a half-dozen castings made up of beetles' elytra on a favourite perching-place, and decomposed castings in old nests which he dug out. The food seemed to be exclusively insects, "especially bees, wasps, locusts, and beetles."³⁷

[At the reading of the paper, Mr. W. E. Glegg, F.Z.S., stated that a Bee-eater had been seen to eject through the mouth the remains of a beetle.]

CUCKOO.

Seeböhm says of this bird : "The food of the Cuckoo consists principally of beetles, butterflies, moths and other insects, with their larvæ. It is extremely fond of caterpillars, and especially those that are covered with hairs. Vegetable fibres and blades of grass have been occasionally found in its stomach, which is often packed full of the hairs from caterpillars and other insect-

³⁴ *Zoologist*, 1875, p. 4477.

³⁵ *Zoologist*, 1875, p. 4474.

³⁶ *History of British Birds*, 1884, p. 350.

³⁷ *History of British Birds*, 1884, p. 322.

remains in a globular mass or pellet, which is afterwards ejected from the mouth."³⁸

Saunders writes to the same effect.³⁹

Our member, Mr. F. J. Stubbs, confirms that the Cuckoo throws pellets. He says (*in litt.*, Nov. 20, 1922), "These are cast by the nestlings, at least, but it is a long time since I noticed any."

BARN OWL.

Records of more or less detailed dissections of pellets of this Owl, taken from the nest, are legion: it is only necessary here to give a list of the included remains and references to the original notes.⁴⁰

The constituents of the pellets examined were as follow:—

Noctule Bat	Mole
Pipistrelle Bat	Pigmy Shrew
Young Rat	Small birds (greenfinch, house-sparrow, thrush, dunlin, starling, skylark, young rook, blackbird, etc.)
Long-tailed Field Mouse	
House Mouse	
Field Vole	
Bank Vole	Frog
Common Shrew	

The Barn Owl has been seen to throw up its pellets.

Specimens of Barn Owl pellets in the Essex Muesum have been found to contain bones of long-eared bat, a complete skull also teeth and bones of brown rat, portions of the cranium and jaws of a small *mus*, a ramus with teeth of field vole, mammalian fur, a skull of a finch, and various unidentified bones.

LONG-EARED OWL.

Castings of this bird have been picked up in and about the nest, and examined by various observers.

Their contents included remains of brown rats, long-tailed field mice, field voles, common shrews, bank voles, water voles, frogs, toads, sparrows, buntings, chaffinches and other finches, a swallow, and beetles.⁴¹

³⁸ *History of British Birds*, 1884, p. 381.

³⁹ *British Birds*, 1889, p. 278.

⁴⁰ Frances Pitt's *Wild Creatures of Garden and Hedgerow*, 1920, p. 84. *Zoologist*, 1873 pp. 3685-6; *ibid.* 1849, p. 2477; *ibid.* 1910, p. 136. Bolam's *Wild Life in Wales*, 1913, p. 312., *Mag. of Nat. Hist.* 1832-33, p. 727 and p. 13. *Birds of the British Isles*, 1919, p. 291. Harting, in his edition of White's *Selborne*, p. 178. *Zoologist*, 1879, p. 341; *ibid.* 1886, p. 159; *ibid.* 1912, p. 128; *ibid.* 1901, p. 137; *ibid.* 1902, p. 212; *ibid.* 1907, p. 127; *ibid.* 1908, pp. 127. and 346; *ibid.* 1905, p. 226; *ibid.* 1876, pp. 4832 and 4871; *ibid.* 1894, p. 87; *ibid.* 1888, p. 83; *ibid.* 1895, p. 173. *Land and Water*, May 1, 1919. Bell's *Brit. Quadrupeds* 2nd edn., p. 144. *Zoologist*, 1898, p. 215; *ibid.* 1906, p. 121. *British Birds*, V., p. 113. Board of Agriculture, Leaflet No. 51.

⁴¹ *Zoologist*, 1892, p. 364; *ibid.* 1904, pp. 259, 385; *ibid.* 1905, p. 312. Saunders's *British Birds*, 1889, p. 284. *Journ. Northamptonsh. Nat. Hist. Soc.*, June 1898 (quoted in *Zoologist*, 1898, pp. 449-451). Harting, in his edn. of White's *Selborne*, p. 178. [*British Birds*, 1915-16, p. 59.

SHORT-EARED OWL.

Pellets of this bird picked up close to the nest contained bones and fur of water vole⁴², field mice⁴³, shrews, brown rat, small warbler.⁴⁴

TAWNY OWL.

That close observer of birds, Gilbert White, so long ago as 1788 recorded that this bird casts pellets. He says: "Having some acquaintance with a tame brown owl, I find that it casts up the fur of mice, and the feathers of birds, in pellets, after the manner of hawks."⁴⁵

Since Gilbert White's day, numerous observers have collected and noted the contents of the castings of this owl. The results of their investigations prove that the pellets include remains of:—

Brown Rat	Rabbit fur
House Mouse	Stoat
Field Vole	Squirrel
Long-tailed Field Mouse	Beetles (<i>Carabus granulatus</i> , <i>Dytiscus marginalis</i> , <i>Silpha rugosa</i> , <i>Harpalus</i>] sp., <i>Geotrupes ster-</i> <i>corarius</i> , etc.) ⁴⁶
Bank Vole	
Common Shrew	
Mole	
Small birds	

Pellets of Tawny Owl in the Essex Museum collection contain mammalian fur, jaws and other bones of both *mus* and field vole, the pelvis with caudal vertebræ, and a rear tibia and fibula, of a mole, sterna of small birds, and thoraces and elytra of a dung-beetle (*Geotrupes typhæus*).

One pellet of Tawny Owl in the Essex Museum was perforated, when found, with six or eight borings of a living beetle, *Trichopteryx* sp., a creature which usually occurs in hot-beds, haystack refuse, etc.; no doubt the warm moist pellet, freshly ejected, was an attraction!

TENGMALM'S OWL.

It is recorded that the food of this owl includes remains of *Eliomys quercinus* in pellets.⁴⁷

⁴² *Zoologist*, 1899, p. 121. Harting, in his edn. of White's *Selborne*, p. 178.

⁴³ *Zoologist*, 1873, p. 3465. Board of Agriculture, Leaflet No. 42.

⁴⁴ *Zoologist*, 1904, p. 27.

⁴⁵ *Natural History of Selborne*, p. 40.

⁴⁶ *Zoologist*, 1884, p. 100; *ibid.* 1912, pp. 293-297; *ibid.* 1913, p. 170; *ibid.* 1881, p. 314; *ibid.* 1865, p. 9653; *ibid.* 1849, p. 2478. Millais' *Mammals of Great Britain and Ireland*, 1905, p. 196. Harting, in his edition of White's *Selborne*, p. 178.

⁴⁷ Witherby's *Practical Handbook of British Birds*, vol. 2, 1920, p. 73.

LITTLE OWL.

Much discussion has taken place as to the character of this 'comparatively' new-comer to this country, whether it is or is not guilty of destroying young game-birds, and numbers of the pellets which it throws up have been collected and examined with a view to determining this point.

Dr. W. E. Collinge⁴⁸ carried out an exhaustive investigation of 267 pellets of this bird, and of the contents of 194 stomachs, and gives a list showing the great variety of its food. The included remains were identified as under :—

ANNEIDS.	<i>Hylesinus fraxini</i>
Various earthworms	<i>Hepialus lupulinus</i>
WOOD-LICE.	<i>Hybernica defoliaria</i>
<i>Oniscus asellus</i>	<i>Cheimatobia brumata</i>
<i>Porcellio scaber</i>	<i>Mamestra brassicae</i>
MYRIOPOD.	<i>Agrotis segetum</i>
<i>Polydesmus</i> , sp.	<i>Agrotis exclamationis</i>
INSECTS.	<i>Triphaena pronuba</i>
Earwig	<i>Tortrix viridana</i>
Unidentified larvæ	<i>Tipula oleracea</i>
<i>Carabus violaceus</i>	<i>Tipula paludosa</i>
<i>Harpalus</i> , sp.	<i>Pachyrhina maculosa</i>
<i>Pterostichus madidus</i>	<i>Nematus</i> , sp.
<i>Pterostichus</i> , sp.	AMPHIBIAN.
<i>Oxyptus olens</i>	Frog
<i>Philonthus</i> , sp.	BIRDS.
<i>Stilpha opaca</i>	House-sparrow
<i>Aphodius fimetarius</i>	Starling
<i>Aphodius</i> , sp.	Blackbird
<i>Geotrupes stercorarius</i>	Mistle Thrush
<i>Rhizotrogus solstitialis</i>	Chaffinch
<i>Melolontha vulgaris</i>	Greenfinch
<i>Phyllopertha horticola</i>	Sky-lark
<i>Elatér</i> , sp.	Wood Pigeon
<i>Athous niger</i>	Pheasant
<i>Athous</i> , sp.	MAMMALS.
<i>Agriotes sputator</i>	Short-tailed Field Vole
<i>Agriotes obscurus</i>	Bank Vole
<i>Agriotes lineatus</i>	Brown Rat
<i>Apten</i> , sp.	House Mouse
<i>Otiorynchus picipes</i>	Long-tailed Field Mouse
<i>Otiorynchus tenebrioides</i>	Common Shrew
<i>Otiorynchus sulcatus</i>	Mole
<i>Sitones</i> , sp.	Also a little vegetable matter, such
<i>Ceuthorrhynchus</i> , sp.	as grass, leaf fragments, and
<i>Hylebius abietis</i>	seeds of weeds
<i>Scolytus</i> , sp.	

⁴⁸ Journ. of the Ministry of Agriculture, March 1922, p. 1133.

On the vexed question of the destruction of young game-birds by the Little Owl, Dr. Collinge comes to the conclusion that the percentage of remains of game birds in the pellets or stomachs is infinitesimal; he is, however, careful to add: "It is not stated that the Little Owl does not destroy young game birds, for it does, but it is contended that the actual percentage is so small that it is, under ordinary circumstances, negligible." He emphasizes the fact, proved by the evidence, that the bulk of the Little Owl's food consists of injurious and neutral insects, voles and mice, and justly contends "A bird that feeds largely upon wireworms and click beetles by day and voles and mice by night, is surely worthy of protection."

Still more recent researches of Dr. Collinge⁴⁹, made on the stomach contents of 98 Little Owls, which were sent him from Hampshire (a game-breeding district) during May, June and July of this year, confirm the foregoing results. Of the total bulk of food examined, "91.57 per cent. consisted of animal matter, and 8.43 per cent. of vegetable matter. Of the animal content 57.34 per cent. consisted of insects, 20.28 per cent. of earthworms, 7.71 per cent. of voles and mice, 2.94 per cent. of wild birds (mostly house-sparrows), and 1.78 per cent. of game birds and poultry. Wireworms and click beetles constituted 10.10 per cent. and cockchafer and their larvæ 5.10 per cent. of the insect content. The neutral insects consisted in the main of Dung Beetles (*Geotrupes*) and a few small moths."

It is, therefore, evident from Dr. Collinge's patient investigations that the injury done to game-preserves by the Little Owl is relatively insignificant; while, on the other hand, the bird is a highly beneficial agent by devouring agricultural pests, and, like its congeners, is deserving of protection against ignorant prejudice.

Other examinations, not so detailed as Dr. Collinge's, nevertheless tend to confirm the above statements.⁵⁰

Specimens of Little Owl pellets in the Essex Museum contain mammalian fur, rami of field-vole, and limbs of a dung-beetle (*Geotrupes*).

⁴⁹ *Journal Ministry of Agriculture*, Nov. 1922, p. 750.

⁵⁰ Cf. *Zoologist*, 1914, p. 113; 1916, p. 268; 1886, p. 473. *British Birds*, III, p. 328; vi., pp. 19, 65, 66. Coward's *Birds of the Brit. Isles*, 1919, p. 304. Coward's: "Note on the Little Owl and its Food," *Manchester Memoirs*, lvi., 1912, No. 8.

SOUTHERN LITTLE OWL.

(Carine glaux.)

Mr. Oldfield Thomas examined pellets of this Egyptian race of owl, and recognised teeth of the musk shrew, *Crocidura religiosa* of *Arvicanthis variegatus*, and the Egyptian form of the house mouse, *Mus musculus orientalis*, with skulls of house sparrow. Insect remains were comparatively scarce but included mandibles, etc., of the false scorpion *Galeodes arabs*. The house mice were in the greatest number, but the shrew-remains were numerous.⁵¹

Mr. T. A. Coward observed that pellets of this bird, received by him from Luxor, in Upper Egypt, included "considerable quantities of sand mixed with and felted into the hair in the interior of the pellet."⁵²

MOTTLED WOOD-OWL.

(Syrnium ocellatum.)

Castings of this Bengal species of owl were examined, and found to consist of small rodents.⁵³

SPOTTED OWLET.

(Athene brama.)

Another Bengal owl, whose pellets were found to consist of insects and bats.⁵⁴

SNOWY OWL.

A captive bird of this species was observed repeatedly to throw up castings.⁵⁵ Other pellets, examined in the Arctic regions, were found to contain remains of lemmings,⁵⁶ and of the Little Auk.⁵⁷

Witherby says that spiders are found in its castings.⁵⁸

SPOTTED EAGLE OWL OF SOUTH AFRICA.

Of this South African owl (? *Bubo capensis* or *B. maculosus*) it is recorded: "Before the young are hatched there is a pretty fair layer of pellets ejected by the sitting bird, and this forms a soft bed for the little ones."⁵⁹

⁵¹ T. A. Coward, F.Z.S., "Note on the Little Owl and its Food," Manchester Memoirs, vol. lvi., 1912, No. 8.

⁵² *Ibid.*

⁵³ *Zoologist*, 1902, p. 212.

⁵⁴ *Ibid.*, 1902, p. 213.

⁵⁵ *Zoologist*, 1863, p. 8639; *ibid.* 1864, p. 9318.

⁵⁶ *Zoologist*, 1878, p. 417; *ibid.* 1880, p. 121.

⁵⁷ *Zoologist*, 1895, p. 90.

⁵⁸ *Practical Handbook of British Birds*, ii., 1920, p. 66.

⁵⁹ *Zoologist*, 1875, p. 4353.

EAGLE OWL.
(*Bubo ignavus*.)

Observers note that this bird makes no proper nest, but the nestlings lie upon a mass of castings of the parents composed of the fur of rats, rabbits and other small mammals.⁶⁰

COMMON BUZZARD.

A captive bird of this species was seen to throw up pellets composed of "feathers, bones, and other indigestible matter" of undetermined character.⁶¹

Mr. T. A. Coward says of this bird: "Mammals it will kill up to the size of a young rabbit, but its pellets prove that beetles, especially large ones, are hunted for, and it is known to devour earthworms. It has no objection to feed on even offensive carrion and frequently eats dead lambs on the fells."⁶²

Mr. J. H. Salter found, in a nest which contained three young ones, provision for their sustenance comprising a shrew, a mouse, and a piece of sheep intestine. "Later, the nest contained pellets and the remains of a crow."⁶³

Pellets of this bird in the Essex Museum are composed of mammalian fur and bones, including a jaw (left lower ramus) of mole, with teeth, and a foot of a young rabbit.

GOLDEN EAGLE.

"The golden eagle . . . periodically removes the castings of its offspring—the bones, fur and feathers, matted into a ball or 'pellet' and thrown out by the mouth—bones and other broken remains of feasts, and soiled pieces of heather of which the nest is commonly largely composed."⁶⁴

WHITE-TAILED EAGLE.

The Essex Museum possesses a pellet of this eagle which was picked up by the keeper beneath the bird's roost in the Derwent Valley, Derbyshire, in January 1921. It contains a foot and claws of grouse, mammalian fur, and also stems and leaves of heather (*Calluna*) and other plant-fragments, probably derived at second hand from the stomach of the grouse eaten.

Of the same species (probably the same individual bird),

⁶⁰ Saunders's *British Birds*, 1889, p. 300.

⁶¹ *Zoologist*, 1867, p. 597.

⁶² *Birds of the British Isles*, 1919, p. 314.

⁶³ *Zoologist*, 1895, p. 180.

⁶⁴ Pycraft, *Infancy of Animals*, p. 74.

it is recorded that castings contained the beak and bones of grouse, bones and fur of hare (also probably of rabbit), and traces of sheep's wool, most likely from carrion).⁶⁵

SPARROW HAWK.

Our member, Mr. J. H. Owen, than whom nobody has more closely watched the habits of this bird, has often seen pellets lying in and about the nest : he has noticed that the hen-parent clears these out of the nest when thrown up by the nestlings, sometimes herself swallowing them, sometimes removing them to a greater or lesser distance.⁶⁶ Mr. Selous has more than once actually witnessed the regurgitation of a pellet.⁶⁷

The castings include remains of young birds (including young pheasants).⁶⁸

In a recent article on the " Menu of the Sparrow-hawk " ⁶⁹ Mr. Owen writes : " I have seen their pellets containing the remains of beetles. Another time I found pellets containing the shell of a greenfinch's egg. The hawk had caught the greenfinch when the egg was ready for extrusion, and had, I suppose, swallowed the egg just as if it had been the wretched bird's gizzard."

Mr. Owen describes the Sparrow-hawk's pellets, which he found at a favourite perching place, as being " quite small and cylindrical, and composed of bone and feathers, not so compact as those of the owls or even the kestrel, very dark in colour, but not black. The nest . . . was not more than 50 yards away."

KITE.

Mr. T. E. Gunn examined the stomach-contents of a specimen of this bird, which comprised a mass of dried grass and two yellow berries ; this, he considered, had been swallowed with its more usual food, " and was in process of being formed into a ball or pellet for the purpose of being ejected." ⁷⁰

An observer who visited a nest of the Kite saw no pellets at the foot of the nesting-tree, but was informed that in previous years a quantity of castings with feathers and fur had been seen.⁷¹

⁶⁵ *British Birds*, xiv., p. 259.

⁶⁶ *British Birds*, 1916-17, pp. 30, 54, 77.

⁶⁷ *Zoologist*, 1911, pp. 48, 181.

⁶⁸ *Zoologist*, 1885, p. 51.

⁶⁹ *Nineteenth Century and After*, Nov. 1922.

⁷⁰ *Zoologist*, 1884, p. 2.

⁷¹ *Zoologist*, 1881, p. 405.

PEREGRINE FALCON.

Pellets of large size, picked up at the nest, were found to consist chiefly of rabbit's fur⁷², or of remains of rock dove, stock dove, and other smaller birds.⁷³

A captive hen bird was noticed, as long ago as 1844, to throw up pellets.⁷⁴

Pellets of Peregrine Falcon found near St. Abb's Head were found, on examination, to be almost entirely composed of bones and feathers of gulls, mixed in other cases with feathers of partridge and bones of rabbits and leverets.⁷⁵

Pellets of this species in the Essex Museum, which were taken from an eyrie containing three eggs, consist chiefly of mammalian fur and bones, feathers and bones of birds, and a few grass-fibres.

HOBBY.

Castings found in the nest were associated with large beetle-elytra, a foot and part of a wing of blackbird, one tail-feather of song thrush, and wing and tail feathers of blue tit,⁷⁶ also the wing of a wheatear and the leg and foot of swift.⁷⁷

A female hobby, shot near Norwich in 1858, was found, on dissection, to have a pellet of feathers ready for excretion.⁷⁸

MERLIN.

A visitor found many pellets of this bird at the nest, together with remains of meadow pipit, greenfinch and grouse.⁷⁹

Mr. W. Rowan saw a nestling merlin throw up a pellet, with some difficulty. He says: "It gave him nearly as much trouble to eject this as the swallowing of the leg [a pipit's leg] had given him."⁸⁰

Pellets of Merlin in the Essex Museum collection, taken from a nest containing young birds, include feathers and bones of birds, beetle and other insect remains, a small quartz-fragment and a pine-needle.

KESTREL.

Pellets of this bird are frequently met with in and about the

⁷² *Zoologist*, 1876, p. 5029.

⁷³ *British Birds*, III., 1909-10, p. 55.

⁷⁴ *Zoologist*, 1844, p. 555.

⁷⁵ Yarrell, 4th ed., I., p. 59.

⁷⁶ *Zoologist*, 1907, p. 335.

⁷⁷ *British Birds*, III., p. 320.

⁷⁸ *Zoologist*, 1858, p. 6058.

⁷⁹ *Zoologist*, 1905, p. 267.

⁸⁰ *British Birds*, XV., 1922, p. 247.

nest,⁸¹ and have repeatedly been seen to be thrown up by captive birds.⁸² Their contents comprise many fragmentary beetle remains, teeth of bank vole, mice and rat fur and bones, shrews, etc., and but very few bird-remains.⁸³

We have numerous examples in the Essex Museum, including some which were actually taken from a nest in Texel by Mr. W. Glegg: they contain the maxillæ and teeth of field vole, fur of same, rami and teeth of shrew, recognisable feathers of robin, the skull and sternum of a small bird (? robin), some fish scales (perhaps derived at second hand from the shrew), comminuted remains of beetles, some small rounded fragments of stone, and a small metal disc.

LESSER KESTREL.

Mr. Howard Saunders records that numerous ejected pellets of this bird litter the towers frequented by it; their contents included remains of insects, especially cockchafers and other beetles, also grasshoppers and remains of small lizards.⁸⁴

CORMORANT.

Mr. George Bolam, describing a visit he paid to a roosting-place of these birds in Wales, noted castings lying beneath the roosting-trees. He noted scales of perch, roach, or rudd, and once remains of eel, as forming part of the food-masses.⁸⁵

Mr. T. A. Coward describes a characteristic attitude of Cormorants, "As they sit they gape, as if *blasé*; probably they are striving to eject the pellets of undigested food."⁸⁶

SHAG.

Mr. A. H. Patterson records how a bird of this species, which he kept in captivity, ejected the more indigestible fish-bones of its food "after the manner of an owl."⁸⁷

HERON.

Hérons are well known to cast pellets. There are good specimens in our Stratford Museum, which were picked up beneath the trees of the heronry at Wanstead Park: their size is considerable.

⁸¹ *Zoologist*, 1908, p. 347.

⁸² Cf. *Zoologist*, 1899, p. 113; *ibid.* 1865 p. 9678. *British Birds*, iv., 1910-11, p. 302.

⁸³ Cf. *Zoologist*, 1895, p. 173; 1878, p. 347; 1888 p. 269; 1892, p. 364; 1871, p. 2739; 1872, p. 3099; 1873, p. 3467. Bolam's *Wild Life in Wales*, 1913, pp. 260, 356.

⁸⁴ *British Birds*, 1889, p. 346.

⁸⁵ *Wild Life in Wales*, 1913, p. 46.

⁸⁶ *Birds of the British Isles*, 1919, p. 350.

⁸⁷ *Nature in Eastern Norfolk*, 1905, p. 168.

Dissection of the pellets shows remains of water beetles, bones of water vole, mole and other mammalian fur, claws of mole and the claw of a rat ? ; bones of birds are included.

One of the Wanstead Park pellets is interesting from the fact that in it is embedded a portion of the sternum, with its characteristic spine, of the great water beetle (*Hydrophilus piceus*) which is rare in the district : another contains an elytron of the commoner aquatic beetle *Dyticus marginalis*.

PURPLE HERON.

Mr. A. H. Patterson records that a young male bird of this species, on dissection, was found to contain in its stomach "a pellet of mouse hair, probably of the short-tailed species."⁸⁸

COMMON BITTERN.

It would appear that the Bittern shares the habit of pellet-casting, as observers have noted the presence in the stomach of "a hard pellet of the fur of some animal,"⁸⁹ and "the fur of water rats and mice, rolled up in small, hard, oblong pellets."⁹⁰

DOMESTIC GOOSE.

Some presumed pellets of this bird from Kew Green and from Epping Forest, alike composed of plant-husks, are in the Essex Museum, as are also similar "pellets" obtained from the CHINESE GOOSE (*Cycnopsis cycnoides*) from an ornamental lake at Carnarvon, N. Wales.

RING-DOVE.

The well-known falconer, Mr. J. T. Mann, of Bishop's Stortford, records his surprise at observing that the Ring-dove ejects pellets. He says : "When hawking in Cambridgeshire on Dec. 15th, I went from the open land through a wood frequented (at that season) by hundreds of wood pigeons. Among their droppings I saw some oval-shaped 'castings,' about an inch in length. I have noticed this in the shrikes, rooks, and swallows, but never in this form in the pigeon. I am aware of the manner they feed their young, but I must say I was ignorant of the fact of pigeons ejecting castings such as I found composed of husks of barley and beech-nuts, grass, or clover, and small stones."⁹¹

⁸⁸ *Nature in Eastern Norfolk*, 1905, p. 171.

⁸⁹ *Zoologist*, 1864, p. 8961.

⁹⁰ *Zoologist*, 1879, p. 115.

⁹¹ *Zoologist*, 1887, p. 193.

Commenting on the above observation, Mr. E. W. H. Blagg suggests that the wood pigeon probably casts pellets only at certain seasons of the year, when it has been feeding upon certain kinds of food. He adds : " A few days ago (May 14th), I found several ' castings ' of this bird, composed chiefly of the husks of oats."⁹²

A pellet of this bird in the Essex Museum, picked up from beneath a roosting tree, in March 1910, is made up entirely of seeds of Holly.

CURLEW.

Mr. R. Elmhirst, in 1915, described how he found, on a favourite roosting-place of Curlews, numerous pellets, composed chiefly of fragments of quartz and shells, which he reasonably assumed to be castings of this bird. He describes them as " about one inch long by half an inch broad, and consisting of 30 to 40 small bits of quartz, and weighing about four grains : some of them contain a few bits of shell, and one consists almost entirely of shell."⁹³

Mr. J. E. Harting records that he extracted cockles of large size, with the shells unbroken, from the stomach of a Curlew, and he wondered how they could possibly have been swallowed whole.⁹⁴ Specimens of entire shells of *Cardium* taken by Mr. Harting from a Curlew's stomach are in the Essex Museum, the size of the largest being 22 mm. by 20 mm., and another measuring 20 mm. by 18 mm.

TERNS.

Mr. H. W. Robinson states : " I have studied very carefully the food of Terns, and handled over two thousand young ones, the majority of which regurgitated the contents of their crops. The chief food of the common Tern consists of young herrings, with a fair number of whiting, and also a few young codling, lumpsuckers, and long rough dabs." (In *Yorkshire Post*, quoted in *NATURALIST*, July 1, 1920, p. 208). Mr. Robinson does not say, however, if this regurgitated food takes the form of pellets.

BLACK-HEADED GULL.

Pellets of this species are of common occurrence on the feeding-spots. Useful testimony to the beneficial character of

⁹² *Ibid.* p. 236.

⁹³ *Zoologist*, 1915, p. 71.

⁹⁴ *Zoologist*, 1884, p. 68.

the Black-headed Gull is given by Mr. Robert Newstead in his Supplement to the Journal of the Board of Agriculture, December 1908, on the "Food of Some British Birds." He says: "Fortunately the birds were, and are still, strictly protected in this area" [Chester]. "And this because, among other things, it devours enormous numbers of crane-flies and their larvæ—leather jackets. During the plague of these insects which devastated the Dee Marshes in 1901, these Gulls gathered in hundreds to the feast, and gorged themselves so completely that the pellets, or castings, thrown up were left scattered over the land, looking like little bundles of dead grass."⁹⁵

Mr. J. E. Harting confirms this (*in litt.* Sept. 27, 1919) and adds the interesting fact that one of the pellets contained the remains of no less than "400 crane-flies and 1,600 eggs, which had evidently been devoured in the bodies of the flies."

The Essex Museum contains at present only a single pellet of this species of gull, taken from a nesting place: it contains remains of a ground-beetle (*Carabus*, sp.), some fish bones, and some fragments of plants.

COMMON GULL.

Mr. E. E. Pettitt, writing in *Land and Water*,⁹⁶ remarks that the Common Gull "even when nesting many miles inland, constantly travels to the coast for food, as is shown by castings composed of crabs and other small crustaceans lying around the nests."

HERRING GULL.

Many records exist of pellets thrown up by these birds, and collected at their roosting-places. Specimens are in the Essex Museum, which were collected by Miss G. Lister at Mullion Island, near the Lizard, and duly recorded in the *ESSEX NATURALIST*.⁹⁷ Captive birds have been observed to throw pellets.⁹⁸

The contents of the pellets are recorded to be of very varied nature, including fish-bones, green husks, horsehair, the bark of the tree-mallow, candle-ends (!), shells of immature mussels, oat husks, fragments of crabs, feathers and bones of birds, ear-

⁹⁵ Quoted by Pycraft in *British Birds*, 1908-9, p. 316.

⁹⁶ *Land and Water*, Aug. 21, 1919.

⁹⁷ *ESSEX NATURALIST*, xvi., p. 120.

⁹⁸ *Zoologist*, 1880, p. 362.

wigs, fragments of eggshells of Guillemot and Razorbill, grass, and small stones, a very mixed diet.⁹⁹

Specimens in the Essex Museum are composed of crab-fragments, broken fragments of mussel shells, fish vertebræ and other bones, including the pavement-like pharyngeal teeth of wrasse, two entire legs of a small passerine bird, teeth and bones of a young rabbit, grain-husks, the fibrous bark of the sea-mallow (*Lavatera*), and a little sand.

LESSER BLACK-BACKED GULL.

This Gull has been observed to throw up castings when in captivity, and its pellets have been picked up at the nesting-places. They were found to contain bones and fur of water vole, fish-bones, crab remains and grain-husks.¹⁰⁰

Pellets of this Gull (originally globular in shape, but now disintegrated) in the Essex Museum collection are made up of large numbers of comminuted fragments of shells of a mollusc (*Tellina* sp.), including one perfect shell with adherent valves, and also a few insect remains.

GREAT BLACK-BACKED GULL.

Various records exist of pellets of this Gull being found near the nest. Mr. O. V. Aplin, for instance, records finding a pellet "half as large again as a golf-ball, composed apparently entirely of Puffins' feathers" by the side of a nest,¹⁰¹ and other observers have found pellets in similar close juxtaposition to the nest.¹⁰²

During the autumn of 1921 I found a casting, almost certainly of this species of gull, on the saltings of Canvey Island, which was entirely made up of fragments of crab's claws, but which was so fragile as to crumble at a touch and so could not be preserved.

The recorded contents of the pellets include fur and bones of young rabbits, crabs' claws, fur and bones of moles, voles and shrews, the remains of mole being particularly abundant according to one observer.

LARUS DOMINICANUS.

Mr. T. H. Potts, F.L.S., found castings in or about the nest of this New Zealand gull, which contained remains of mussels.¹⁰³

99 cf. *Zoologist*, 1880, p. 362; *ibid.* 1894, p. 343. *British Birds*, iv., p. 124. *Zoologist*, 1906, p. 94. *Glasgow Naturalist*, ii., 1910, pp. 130-1.

100 *Zoologist*, 1895, p. 251; *ibid.* 1906, p. 94. Saunders's *British Birds*, 1889, p. 660.

101 *Zoologist*, 1903, p. 201.

102 *Zoologist*, 1886, p. 95; *ibid.* 1890, p. 326.

103 *Zoologist*, 1875, p. 4487.

GLAUCOUS GULL.

Mr. H. W. Feilden, the well-known ornithologist, records how he visited a breeding place of this species, the rock-ledges being "covered with the ordure and castings of the birds, and the remains of Little Auks."¹⁰⁴

IVORY GULL.

It is recorded by Seebohm that Captain M'Clintock found the remains of lemmings round a nest of the Ivory Gull, "and also fresh pellets consisting of their hair and bones."¹⁰⁵

GREAT SKUA.

Major Feilden found castings of this bird, composed principally of the bones and feathers of Kittiwakes, near the nesting colony on the Faroe Islands.¹⁰⁶

GREAT CRESTED GREBE.

RED-NECKED GREBE.

SLAVONIAN GREBE.

EARED GREBE.

All the above Grebes are believed to throw up castings. Agglutinated oval masses of their own feathers swallowed during preening have been found in their stomachs by various observers, including J. E. Harting, and "these, in all probability, would have been cast up in due time had the birds not been shot."¹⁰⁷

Mr. J. Vincent, in a recent number of *British Birds*,¹⁰⁸ records finding a hard ball of vegetable matter (? *Potamogeton*) in the gizzard of a Great Crested Grebe on dissection. This was probably a pellet in course of formation.

LITTLE GREBE.

A bird of this species from Felsted, Essex, now in the Essex Museum, was found on dissection to contain in its crop recognisable fronds of *Lemna trisulca*, various elytra of the water beetle, *Brychius elevatus*, and several broken elytra of another aquatic beetle, *Deronectes* sp. (either *depressus* or *12-pustulatus*), also a small angular fragment of flint; no trace of a pellet in course of

¹⁰⁴ *Zoologist*, 1878, p. 383

¹⁰⁵ *British Birds*, 1885, iii., p. 338

¹⁰⁶ Cf. Seebohm's *British Birds* 1885, iii., p. 348. Saunders's *British Birds*, 1889, p. 672.

Miss Frances Pitt (in *British Birds*, Dec. 1922, p. 179) observed castings of this bird, with droppings and feathers, littering the ground at a standing place frequented by the Skuas.

¹⁰⁷ Cf. *Zoologist*, 1889, p. 21; *ibid* 1865, pp. 9449, 9565, and 9619. Saunders's *British Birds*, 1889, p. 702

¹⁰⁸ *British Birds*, xv. 1922, p. 290.

formation was found, but the nature of the food would imply that this species also has the habit of casting pellets.

In conclusion, I have to thank those of our Members, especially Miss G. Lister, F.L.S., Miss A. Hibbert-Ware, F.L.S., Mr. Miller Christy, F.L.S., Mr. W. E. Glegg, F.Z.S., Mr. J. E. Harting, F.L.S., Mr. J. H. Owen and Mr. F. J. Stubbs, who have kindly supplied me with specimens or with information on this subject.

NOTES ON THE GIZZARD CONTENTS OF BIRDS COLLECTED BY MR. MILLER CHRISTY.

By ALICE HIBBERT-WARE, F.L.S.

[Read 25th November, 1922.]

EIGHTEEN months ago, Mr. Thompson asked me to examine the gizzard contents of 50 species of birds that were shot by Mr. Miller Christy, during the autumn, winter and spring seasons, between the years 1876 and 1890. The food substances had during all these years been preserved in cardboard boxes, labelled with the name, date and locality of the birds from whose gizzards they had been removed. It was my task to investigate the nature of these foods, in order either to endorse the investigations of others or possibly here and there to throw a little fresh light on the feeding habits of the birds in question.

I trust that no apology is needed for the subject. To the lover of birds, every detail connected with their lives must have an interest, and nothing is too trivial to record. Besides, certain birds are misunderstood, even maligned as to the nature of their food, and they frequently pay the price of misunderstanding with their lives. The cuckoo, for instance, that was sent to me as a garden pest by an ignorant gardener, had in its gizzard the remains of 57 hairy caterpillars. Had he seen them he would surely have refrained from shooting cuckoos in future.

This, however, is not the side of the subject on which I mean to dwell this afternoon. The point is, here are the gizzard contents of 50 species of birds. Can such dry dust as this prove to be in any way interesting? Mr. Christy's collection shows that it can.

Here, for instance, in a box marked "kestrel," are pellets taken from a chalkpit in Sussex in April 1879. Can you picture

the bird hovering over such a spot ? He suddenly descends and swoops on his prey. The experts tell us that his staple food is mice, voles and beetles. But this time his prey consists of more slippery fare—it is a large slow worm. How do we know this ? Because not only was a chunk of slow worm found intact with the pellets, but wrapped up in them were the rounded scales, bony plates and vertebræ of the same reptile, showing that the bird had really digested a portion of the creature. In the same pellets may be seen :—The fur of a vole, of a mouse, of a bat. Some powdery lumps consist of the jointed hairs of a bat's fur. There are two vole skulls, one rat skull, two bird skulls, a small lizard, almost entire, a land snail (*Zonites cellarius*) and the iridescent blue and green elytra of beetles.

This is not a bad record of a varied diet !

To return to the slow worm. He may be recognised, even if all his bones are comminuted, by means of the presence of innumerable bony plates in the matrix. The slow worm is a lizard rather than a snake. It is the only British representative of the Family of Lizards known as the *Scincidæ*, which are characterized by possessing a rigidity of body not found in other lizards or in snakes. This feature is due to the presence of a framework of bony plates below the scales ; each plate has a scale attached to it. In examining the food of the Magpie in Mr. Christy's collection, the bony plates and scales of a small slow worm were discovered and identified from the presence of these plates.

Another specially interesting component of the kestrel's pellets was furnished by the hairs of the bat. These when once seen are unmistakable. I learned them first in the pellet of a Little Owl. Bone-like fragments in the powder of a pellet afforded a problem, and I examined the hairs of many spiders and insects in vain, till at last a hair was found in a pellet that had escaped comminution. With Miss Lister's help the fragments proved to be the broken hairs of a bat. Powdery lumps in the kestrel's pellet have a similar origin. Mr. Witherby, in the *Practical Handbook of British Birds*, says of the kestrel's food :—" Quite exceptionally bats."

In the pellets of the Barn Owls from six localities, the predominating food traces are those of shrews, voles, mice and sparrows, though there are also remnants of bats and beetles.

There are no surprises to be found in these pellets—the interest of them lies rather in the fact of their uniformity, which is no weak evidence of the usefulness of this species to the farmer and the gamekeeper.

The other owls represented are the Short-Eared and the Tawny. In the pellets of both occur *Geotrupes*, the dor-beetle.

The means of identification of the three types of mammals so universally devoured by birds of prey—shrews, voles and mice—may be of interest. In all, the teeth are the distinguishing mark of the type. Shrews have a complete series of teeth, being insect eaters and not rodents. Their teeth are all conspicuously red brown at the tips, the front incisors in each jaw are longer than the rest, those of the upper jaw being curved. Voles and mice are readily distinguished by means of their molar teeth. Being rodents, there is a wide, toothless gap between the incisors and the molars. The latter in voles are composed of alternating triangular prisms ; in mice the crown of each tooth has a series of tubercles, forming a pattern. Thus the Field Vole is readily distinguished from the Field Mouse by the pattern of the teeth. In the House Mouse the third molar in both jaws is diminutive. The molars have roots in Rats and Mice—those of the two commonest voles, the Field Vole and the Water Rat, are rootless.

The hairs of the fur of these small mammals are interesting, but do not give certain evidence in every case as to the identity of their owners. Those of the mole and shrew invariably show a twist-like extension—that of the mole being more pronounced than in the shrew. No other hairs that I have examined show this feature. The jointed hairs of bats are characteristic. I could not distinguish between the hairs of a vole and of a mouse.

To pass on to the Heron. Of Mr. Christy's three birds, one had fed on a shrew, on a very large number of small larvæ of *Dytiscus* and on one Water-boatman. The second had within him a fair-sized frog, and the third had dined on a mature *Dytiscus* and on a frog.

The collection includes a mass of fish-bones which had lined the nest of a kingfisher, according to the usual custom of this bird.

Of the three members representing the Ducks and Geese the Mallard had eaten a frog, the Goldeneye showed whole and

broken shells of the bivalve *Cyclas cornea* and the Brent Goose had swallowed a mass of a vascular plant and large quantities of sand.

A Stockdove and a Turtledove had their crops crammed with germinating seeds of *Vicia sativa*. Another stockdove was full of corn.

The Rail family are represented by two water rails, a moorhen and a coot. Both water rails had eaten aquatic larvæ, the moorhen showed vegetable matter only and the coot quantities of moss and sand.

The Turnstone, a member of the Plover family, had taken a large number of tiny oysters.

The Grey Phalarope, of an allied family to the last, is described by Howard Saunders as feeding "on small crustaceans and marine animals, the latter obtained by the birds whilst swimming buoyantly on the waves, sometimes hundreds of miles from land." Mr. Christy's Grey Phalarope showed its power of adapting itself to circumstances; at Riccal Cove, York, it had managed to make a meal in which insects predominated.

The various Sandpipers had done exactly what would be expected of them, and had fed on molluscs and crustacea.

There remain a few remarks to be made on the representatives of the Passerines.

If we can judge from this collection, land snails form a large part of the winter food of the Thrushes. The Song Thrush showed three shells, the Redwing 27, and the six Blackbirds had 28 between them. The same record holds for Starlings in winter. The Robin's gizzard was a little entomological museum.

The Dipper contained the jointed appendages of sandhoppers.

The Great Tit had scale leaves and insects in about equal proportions.

The following is the detailed record of the contents of the gizzards examined:—

1. SONG THRUSH (*Turdus musicus*). Southwick, XII. 78. (During frost). 3 *Helix caperata*, 1 *H. rufescens*, 1 *H. cantiana*.

2. REDWING (*T. iliaceus*) Chignal, XII. 78. 27 *Helix rufescens*, 2 worms. Tiny insects.

3. FIELDFARE (*T. pilaris*).

(a) Chignal, XII. 78. 1 *Helix hispida*. A beetle.

- Remains of small insects. Grass. (b) Chignal, 1 79-3 *H. hispida*. 10 hawthorn stones.
4. BLACKBIRD. (*T. merula*).
- (a) York, XI. 77. About 6 cereal husks, 1 beetle.
- (b) 24 XII. 78. 2 haws. *Helix hispida*. *Clausilia rugosa*. Grit.
- (c) Corder's Wood, 28 XII. 78. *Helix caperata*. About 30 grains of wheat.
- (d) Portslade, Sussex, 1. 79. 5 *Helix hispida*. 3 *H. rufescens*. 2 *H. arbustorum*.
- (e) Stackyard, Chignal, 10 1, 79. 6 *Helix hispida*. 1 *Cochlicopa lubrica*. 1 grain of corn. Small pellets of husks. Elytra.
- (f) Chignal, 1. 79. 1 grain of corn. Husks in small pellets. 2 gasteropods (1 *Clausilia rugosa*, 1 *Cochlicopa lubrica*).
- (g) Chignal, VIII. 90. 4 dipterous flies.
5. WHEATEAR (*Saxicola ænanthe*). Devil's Dyke, Sussex. Larva of Click beetle. Elytra.
6. STONECHAT (*Pratincola rubicola*). South Downs, near Shoreham, III. 79. Elytra, etc., of small beetles.
7. ROBIN (*Erithacus rubecula*). York, XI. 77. Small beetles and other insects. Grass.
8. COMMON WHITETHROAT (*Sylvia cinerea*). Saddlescombe, 6 v. 78. Pellet composed of fragments of small insects, chiefly beetles.
9. GOLDCREST (*Regulus cristatus*). Saffron Walden, XII. 81. A mass of tiny insect remains.
10. DIPPER (*Cinclus aquaticus*). Scotland, IX. 78. Appendages of small crustacean.
11. GREAT TIT (*Parus major*). Chelmsford, 2 1. 78. Scale leaves. Insects.
12. MEADOW PIPIT (*Anthus pratensis*).
- (a) Broomfield, 1. 79. Beetles. Wood lice. 1 *Pupa umbilicata*. A little vegetable matter.
- (b) Shoreham (young bird), v. 79. (From pellets at side of nest.) Beetles.
13. GREAT GREY SHRIKE (*Lanius excubitor*). York, xi. 76. Remains of young bird.

14. SPOTTED FLYCATCHER (*Muscicapa grisola*). Saddlescombe, v. 78. Remains of small insects.
15. SWALLOW (*Hirundo rustica*). Birstwith, 14 xi. 77. Fragments of small beetles, etc. Larval skins.
16. HAWFINCH (*Coccothraustes vulgaris*). Lindsell Hall, i. 81. Seeds and nuts in fragments.
17. HOUSE-SPARROW (*Passer domesticus*).
- (a) Chelmsford i. 77. Grain and grit.
 - (b) Chelmsford ii. 78. Grain and grit. One small *Helix*.
 - (c) (A young bird), viii. 78. Whole wheat grains. Small beetles. No grit.
 - (d) Chignal, xii. 78. Whole wheat grains. Much grit.
 - (e) Beeding & Old Shoreham, Sussex, vi. & vii. 79. Whole grains of wheat. A little grit. A few beetle remains. Enclosed in a separate paper is a mass of parts of beetles.
 - (f) Chesterford. A mass of parts of beetles, etc.
 - (g) Chignal, v. 14. Chiefly corn. A few beetle remains.
18. CORNBUNTING (*Emberiza miliaria*). Brighton, x. 78. Seeds and shelly grit.
19. YELLOW BUNTING (*E. citrinella*). Chignal, 2 i. 79. 12 grains of wheat and fragments of wheat.
20. STARLING (*Sturnus vulgaris*).
- (a) York, 1876. 3 *Helix caperata*.
 - (b) Chelmsford ii. 78. 2 *Helix hispida*. A mass of beetle remains.
 - (c) Shoreham, v. 78. A mass of small green beetles.
 - (d) Broomfield, xii. 78. 1 *Helix rufescens*. 1 *H. caperata*. A few small beetles. Corn—about 8 grains.
 - (e) Stevens, Chignal, i. 79. Grass husks.
 - (f) (shot on ice) Pengy, i. 79. 2 *Helix rufescens*. Much beetle remains.
 - (g) Devil's Dyke, Sussex, iii. 79. 4 *Helix hispida*. 1 *Cochlicopa lubrica*. 1 *Pupa umbilicata*. Beetles. A little seed husk.
21. JAY (*Garrulus glandarius*).
- (a) York, x. 76. 10 stones.
 - (b) York, xii. 76. Cereal husks and stones.

- (c) York, x. 77. Wasps. Many remains of insects, chiefly hymenopterons. A few husks. Stones.
- (d) St. Leonard's Forest, 4 VIII. 79. Entirely insectivorous, chiefly beetle.
- 22. MAGPIE (*Pica rustica*).
 - (a) Woodmancote, Sussex, 28 VI. 79. Scales and vertebræ of a tiny slow worm. Elytra of *Geotrupes*. A few seeds.
 - (b) York, x. 77. Grain. Leaves. Worm skins.
- 23. CARRION CROW (*Corvus corone*). Woodmancote, Sussex,
- VI. 76. Fragments of blackbird's egg. 2 down feathers (of moorhen?).
- 24. ROOK (*C. frugilegus*).
 - (a) Chelmsford, 18 IV. 78. Grass husks. Stones.
 - (b) Chelmsford, v. 78. Fragments of *Helix nemoralis*. 1 entire *Zonites cellarius*. Worms. Much husk. Large stones. Leg of beetle.
 - (c) Chignal, XII. 78. Barley. Grass husks. Stones.
 - (d) Perching, Sussex, III. 79. Pellet of husks and stones.
 - (e) Perching, Sussex, 22 III. 79. Large quantity of grain and husks. Portion of bird's skull. A few stones.
- 25. KINGFISHER (*Alcedo ispida*).
 - (a) Audley End Park, Saffron Walden, 10 v. 80. (Bones from nest.) Fish-bones and stones.
 - (b) Audley End, Essex. Fish-bones and stones.
- 26. BARN OWL (*Strix flammea*).
 - (a) Bramber Church, VII. 78. 2 voles. 1 mouse. 1 bird.
 - (b) Beeding Pit, Sussex, 12 v. 79. 3 voles. 4 shrews.
 - (c) St. Botolph's Church Belfry, Sussex. 21 v. 79. 2 shrews. 3 mice. 1 bat. 2 birds.
 - (d) Poyning's Church Tower, Sussex, VI. 79. 2 voles. 2 shrews. 2 mice. 9 small birds (sparrows?).
 - (e) Poyning's Church Tower. 7 shrews. 2 mice. beetle.
 - (f) Audley End Park, v. 80. Rat's skull.
- 27. SHORT-EARED OWL (*Asio accipitrinus*). *Geotrupes*. Fur of mammal.
- 28. TAWNY OWL (*Syrnium aluco*).

- (a) York, x. 76. *Geotrupes*.
 (b) York, xi. 77, Greenfinch.
29. HONEY BUZZARD (*Pernis apivorus*). Insects, chiefly grasshoppers.
30. KESTREL (*Falco tinnunculus*). Pellets.
 (a) Beeding Chalk Pit, Sussex, 29 iv. 79. Vole skull and fur.
 (b) Beeding Chalk Pit, 12 v. 79. Bony plates, rounded scales, vertebræ, etc., of slow worm, with about $\frac{1}{2}$ inch of unbroken body. Fur of vole, mouse, bat in a large lump. The small powdery lumps are chiefly composed of the jointed hairs of bats. Thick hairs of rat? The iridescent blue and green elytra of beetles present in abundance. Short, pointed hairs of beetle (?) abundant. A small lizard, with one foot showing 5 toes, with long claws. 2 vole skulls. 1 mammal tail. 1 rat skull. 2 bird skulls.
31. HERON (*Ardea cinerea*).
 (a) York, x. 77. A very large number of small larvæ of *Dytiscus* beetle. 1 Water Boatman. Fur of shrew.
 (b) York, xi. 77. Frog.
 (c) Chelmsford, i. 78. A mature *Dytiscus*. Frog.
32. BRENT GOOSE (*Bernicla brenta*). Chignal, 14 x. 79. Leaves of a vascular plant in quantities of sand.
33. MALLARD (*Anas boscas*). Chelmsford, i. 78. Frog bones. Earth and small stones.
34. GOLDEN EYE (*Clangula glaucion*). Battles Bridge,
- II. 82. *Cyclas cornea* (Two entire shells and many fragments).
35. STOCK DOVE (*Columba ænas*).
 (a) Saddlescombe, v. 78. Crop crammed with germinating seeds of *Vicia sativa*.
 (b) Chelmsford, 26 xii. 78. Crop crammed with corn. A few of its own feathers.
36. TURTLE DOVE (*Turtur communis*). Saddlescombe, v. 78. A large number of the germinating seeds of *Vicia sativa*.
37. COMMON PARTRIDGE (*Perdix cinerea*).
 (a) Chelmsford, iii. 78. Leaves.

- (b) Chelmsford, 26 XII. 78. 1 grain of wheat. Grass. Much grit.
38. FRENCH PARTRIDGE (*Caccabis rufa*).
 (a) Chelmsford, 23 II. 78. Beetles. Worms. Leaves. Grit.
 (b) Chelmsford, 26 XII. 78. Grain. Grass. Grit.
39. WATER RAIL (*Rallus aquaticus*). Easingwold, XI. 77.
 (a) Chiefly vegetable remains. Chitinous remains of water larvæ.
 (b) Stevens Garden, XII. 78. Water larvæ. Chitin and tracheæ.
40. WATER HEN (*Gallinula chloropus*). Chelmsford, II. 78. Plant remains. Stones.
41. COOT (*Fulica atra*). York, XI. 77. Moss. Duckweed. Other water weeds. Sand.
42. RING PLOVER (*Ægialitis hiaticula*). Norfolk, XI. 76. 4 minute marine gasteropods.
43. TURNSTONE (*Strepsilas interpres*). Battles Bridge, II. 82. Large number of tiny oysters.
44. GREY PHALAROPE (*Phalaropus fulicarius*). Riccal Cove, York, x. 77. Beetles. Isopods (appendages).
45. JACK SNIPE (*Gallinago gallinula*). Chelmsford, I. 77. Beetle. Worm. Grass.
46. PURPLE SANDPIPER (*Tringa striata*). Norfolk, 1876. 2 broken shells, 4 stones.
47. COMMON SANDPIPER (*Totanus hypoleucus*). York, x. 77. Fragments of Crustacea (sand hoppers).
48. WOOD SANDPIPER (*Totanus glareola*). York, XII. 77. Appendages of Crustacea (sand hoppers).
49. GREEN SANDPIPER (*Totanus ochropus*). York, 1878. Small mollusca. Sand.
50. DABCHICK (*Podiceps fluviatilis*). York, x. 76. Water Boatman and other aquatic insects.

Otter at Hockley.—Mr. F. W. Frohawk, in the *Field* for Sept. 9th, 1922, records the capture of a fine adult male otter at Hockley on July 26th, 1922 ; it measured from tip of nose to end of tail $48\frac{1}{2}$ inches, and weighed $24\frac{3}{4}$ lbs.

THE ESSEX FIELD CLUB—REPORT OF MEETINGS.

EASTER VISIT TO SAFFRON WALDEN (546TH MEETING).

APRIL 13TH TO 17TH, 1922.

The third Easter excursion of the Club was, like its predecessors, voted a great success by the Members who constituted the party; this success was chiefly owing to the untiring care and energy of our Member, Mr. George Morris, B.Sc., F.R.A.I., who acted as local organizing secretary and also as conductor to the party.

The visitors, who numbered twenty-one, assembled on Thursday evening at headquarters, the Rose and Crown Hotel, an ancient hostelry of the town mentioned in a poetic itinerary of the 17th century, and probably dating from the 14th century. The oldest part of the present building dates from the end of the 16th century. By special arrangement the whole party were accommodated under its hospitable roof or in the immediate neighbourhood.

On Friday morning the party started in brakes from the Hotel at 9.30 and, after passing the old Park and the Lion Gate of The Mansion at Audley End, crossed the Cam by the bridge erected by Robert Adam, in 1771. Here the view of the west park, with its stream and the red brick bridge in the woodland beyond, was enjoyed. A few minutes brought the visitors to the first alighting place, whence a short walk brought them to a gravel pit in the river terrace, where they were able to inspect, *in situ*, a tusk of the mammoth (*Elephas primigenius*), which had recently been uncovered and left for their inspection. The condition of the specimen, unfortunately, did not allow its preservation, but photographs were obtained by members of the party; some 5 feet length of the tusk was exposed, at a depth of 11 feet from the surface. Subsequently the members had an opportunity of inspecting two molars of mammoth, and teeth of Rhinoceros, from the same pit, which are preserved in the Museum at Audley End.

Proceeding from here, a halt was called at Uttlesford Bridge, and our leader pointed out the Myrtle Hill above the bridge, which was known in old records as the Mutlow (Moot Llaw) Hill, and was probably the meeting place of Uttlesford Hundred.

At the entrance to Newport a halt was made to inspect the "leper stone," a tabular mass of sarsen standing by the roadside. These masses are scattered over the country-side, increasing in number westward as the county boundary is approached, and showing, in many cases, a transition to Hertfordshire conglomerate or "pudding stone," and they are probably the remains of a Tertiary formation now completely eroded. Tradition assigns the leper stone as the place where food was left in medieval times for victims of the disease who had been driven from the community to the waste beyond; but our leader pointed out that the medieval hospital of St. Mary and St. Leonard stood opposite this spot and probably gave the name to the stone. In the wall behind are sections of dressed and moulded clunch which formed responds and pillars in some medieval building, probably the cloisters of the aforesaid hospital.

At the entrance to the village the party dismounted and walked through

the village street, inspecting the various old houses and other historical monuments. The moulded brick chimney stacks (16th century) of Martins Farm were first inspected, and then the 17th century plaster work and shell hood of the Crown House (1692) claimed attention. Passing beneath the railway bridge the notice of tolls on the old Tollgate cottage was next noticed. Passing thence along the village street many old timbered houses were seen, and the triangular area, once the village green, but now much encroached upon and built over, was passed, and the party arrived at Monks Barn. This house, once a Grange of the monks of St. Peter's, Westminster, is a striking example of 15th century building. The timber framing is filled in with diagonal brickwork, largely original, and a striking carving forms the corbel of an oriel window.

A halt was made south of the village to inspect the site of the old Newport pond with the Neolithic settlement above ; and then the drive was resumed to Quendon. Alighting here, a gravel pit behind the Church was visited, where Boulder Clay was seen, *in situ*, above a bed of sand and gravel. A fine St. Acheul hand-axe is said to have been obtained from this spot ; but although a systematic search has been made there has been no confirmation of this statement—in fact, the material of the gravel seems to indicate a Tertiary origin, at least in the lower strata.

At Quendon the visitors were greeted by the sight of the first swallow of the spring, and the willow wren was heard.

Crossing a ploughed field the visitors then entered Quendon Wood, where, by the kind permission of the owner, Mr. Foot-Mitchell, of Quendon Hall, they were able to inspect the hybridisation of the Oxlip (*Primula Elatior*) with the primrose (*Primula vulgaris*). The flowering of these plants had been retarded by the lateness of the season, but sufficient specimens were obtained to enable the members of the party to examine both the pure strains and also the hybrids of these species. Proceeding to the south end of the wood the sight of a considerable mass of wild daffodil (*Narcissus Pseudo-Narcissus*) was enjoyed.

Crossing the intervening fields the party then entered a patch of woodland on the Mid-glacial Gravel and were able to compare the more open character of these woods with those on the Boulder Clay. The foxglove was noted as indicating the absence of Chalk in the soil of this formation.

After a picnic lunch on the edge of the wood, the brakes were again requisitioned, and, after a short drive through country roads, Rickling Hall was reached, where, by the courtesy of the tenant, Mr. C. D. Roeder, an inspection was made of this interesting building.

In the fields south of the Hall are the remains of the mount and bailey of an earlier building. The mount is eighteen-and-a-half feet high and one hundred and thirty-five feet in diameter at the base ; the ditch is now five feet deep and partly destroyed. The ditch and part of the outer bailey have been converted into the moat of the present house. The present Hall, built about 1500, has been divided into a farmhouse and two cottages, with outbuildings. Originally it consisted of two ranges of buildings, separated by a courtyard which was entered by a gateway through the northern range. In 1600 the two side ranges were built, completely enclosing the court. Although much altered many interesting architectural features were noted.

After leaving Rickling Hall the exterior of Rickling Church was examined, and the lichenologists of the party found considerable spoil on the stonework of the building and on the ancient tombstones. From thence the route lay over the water parting into the Wicken Valley; on the left a glimpse was caught of the Moat Farm of gruesome memory, and at Wicken the party alighted to inspect a fine exposure of the Mid-glacial Gravels.

Passing through Wicken to Wicken Bonhunt, the ancient Chapel of St. Elane was seen on the right: and at Newport the party alighted and, crossing the stream, visited the gravel pits. Here an extremely interesting section of faulted and contorted Mid-glacial Gravel, overlaid by Boulder Clay, was seen and photographed. It is difficult to account for such perfect faulting in loose gravels and loams. At the entrance to the pits the clay and gravel is curiously contorted and seems to indicate a definite line of pressure by the ice sheet. It is possible, as a member suggested, that the faulting may have occurred under this pressure when the gravel was in a frozen and, therefore, consolidated condition. After leaving this pit the party returned to Saffron Walden for tea.

Saturday was spent in and about the town. At 9.30 the party left the Hotel, under the guidance of Mr. Raymond, the chemist to the works, to inspect the cement manufacture at the Works on the Thaxted Road. Here the processes of mixing and filtering the Chalk and Boulder Clay, the settling of the "slurry" in open pans, the air-drying and subsequent burning of the residue in kilns, and the final grinding and packing of the manufactured article, were, in turn, ably demonstrated by the conductor.

Leaving the Works, a quick walk was made to the Church, where the Rev. Montagu Benton gave an interesting account of the architecture and history of the fabric.

Leaving the Church a walk of three quarters of a mile brought the party to Engelmann's Carnation Nursery where, under the guidance of the genial proprietor and his foreman, an hour was spent in inspecting a small portion of the extensive range of glass houses, and the innumerable varieties of this favourite flower.

After lunch at the Hotel, a pleasant walk via Abbey Lane and the Park brought the party to the Lion Gate of Audley End; passing through the gate the visitors came to the front of the mansion, and, by the courtesy of Lord Braybrooke, enjoyed the privilege of inspecting this historical building with its treasures of art and science, Lord Braybrooke's agent and the housekeeper acting as conductors.

The Mansion was begun in 1603 and finished in 1616, by the Earl of Suffolk, Thomas Howard, the grandson of Sir Thomas Audley, Chancellor to Henry VIII., to whom was granted the estate of the Abbey of Walden after its dissolution in 1537. The original building was of immense size, including two courts, woodyard, great kitchen, etc. The north, south and west of the great courtyard, with the kitchen, were demolished in 1721, and 30 years later the East range of the inner courtyard, with the projecting wings, was also destroyed. The building was extensively restored in the 18th and 19th centuries, and is now of half H shaped plan with the wings extending towards the east.

Passing through the building the Great Hall, with its screen and many works of art, its great chimney-piece of 17th century date, and numerous

other objects of antiquity, were much admired. The early 17th century staircase, with its carved open well, the original plastered ceiling of the Saloon, and the contents of the fine libraries, may be mentioned as being of special interest. Some time was spent in the lower corridor examining the magnificent collection of stuffed birds and animals housed there. The small Museum of antiquities, obtained from excavations in the locality by the Hon. R. C. Neville between 1840-1860, was visited, and some time was spent examining the Saxon remains from the cemeteries at Linton and the Fleam Dyke, the fine series of Bronze Age pottery from the barrows of the vicinity, and the Roman remains from Great Chesterford, Ickleton and other sites. The buried outfit of a Roman blacksmith, with his stock-in-trade of scythe blades, slave fetters, chariot tyres, etc., excited particular attention.

Altogether our inspection of Audley End was a much more appreciative one than was that of Samuel Pepys, who, on his second visit in 1667, was decidedly difficult to please, and had scarcely a good word to say for either the house or its furniture. But Pepys warmed up in the cellars! "Only the gallery is good, and above all things the cellars, where we went down and drank of much good liquor. And, indeed, the cellars are fine: and here my wife and I did sing to my great content." The present party, although "mighty merry," did not share the diarist's advantages in this respect.

Leaving the Mansion the visitors then inspected the Abbey Farm and Almshouses. This interesting structure was built *circa* 1600 on a double quadrangular plan as an almshouse of twenty tenements, with a chapel, hall and kitchen in the range between the two courts. One court is still used as an almshouse, the second being now converted into two tenements and farm buildings. The Almshouse court, and the kitchen, with its fine fireplace, were inspected. It was noted with regret that the leaded windows with their fragments of stained glass from Walden Abbey and Jesus College, Cambridge, were in a sad state of disrepair.

Returning to Walden, afternoon tea was partaken of in the Humming Bird Room at the Museum, by kind invitation of Mr. and Mrs. George Morris, after which the Castle was visited. This building was probably erected upon the site of the Manor House of Ansgar, Master of the Horse to Edward the Confessor, by Geoffrey de Mandeville, first Earl of Essex, who had received the Manor of Walden as part of the 117 lordships granted him by the Conqueror. The grim Norman keep, built entirely of flint and chalk, was granted by Stephen on the rebellion of the third de Mandeville to one Turgis d'Avranches, a typical "robber" baron. On the rebellion and downfall of this said Turgis the Castle appears to have been dismantled, as it is not mentioned in any later records. The present building consists merely of the shell of the lower storey or dungeon, but traces of the well shaft and fireplace of the first storey and the original wall facing are still visible. In the Castle, an old stone filter from a farm at Hempstead, stone coffins from Berden and Ickleton Priors, and the pillory from Newport are preserved.

At 7.30 p.m. the members of the party attended a reception and entertainment, given in their honour by the Worshipful Mayor (Alderman David Miller, J.P.) and Corporation of the Borough. The visitors were received in the Council Chamber by the Mayor and Mayoress. An excellent musical

programme was rendered by the Orpheus Orchestral Society, assisted by singers of marked talent. During an interval the Mayor cordially welcomed the Club to Saffron Walden, and the President responded, thanking him for his reception. Tea and coffee were served and the town regalia was displayed to the visitors. The Mazer Bowl, belonging to the Guild of the Holy Trinity, from which Samuel Pepys drank at his visit to Walden on Feb. 27, 1659 (as recorded in the famous "Diary"), was specially brought from its resting place in the strong room for inspection by the visitors, and was reverently handled by a favoured few. Pepys' description still holds good; he writes: "They brought me a draft of their drink in a brown bowl tipt with silver, which I drank off, and at the bottom was a picture of the Virgin with the child in her arms, done in silver."

The fine 17th century Maces of the Corporation were also exhibited.

On Sunday morning, by courtesy of the Librarian, Mr. A. E. Gower, the rooms of the Literary and Scientific Institution were visited, and the fine library of over 20,000 volumes was specially opened for the visitors' inspection. The collection contains the libraries of the late George Stacey Gibson and Joshua Clarke, both Essex botanists. Among the treasures exhibited were three portfolios of local prints and drawings, including items of considerable value and interest, and a fine series of illuminated manuscripts recently donated to the Institute by Miss May Gibson.

Leaving the Institute, the party then proceeded to the Museum and spent a couple of hours, under the guidance of the Curator, Mr. Collar, examining the various objects of interest exhibited. The specimen of the now extinct Passenger Pigeon (*Ectopistes migratorius*), shot years ago at Royston, attracted special attention.

In the afternoon the Friends' School was visited. The party assembled in the Lecture Room and Library and listened to a most interesting address by Mr. Morris (who is Science Master here), on the past history of the school. It was founded by the Society of Friends at Clerkenwell in the year 1701, as a workhouse or almshouse for old people and a school for orphans and the children of poor Quakers. As the years passed the scholastic side developed, and the industrial side atrophied, until in 1811 the Old Friends were sent to their respective meetings for maintenance and the Institution became entirely scholastic. In 1786 the Institution was moved to Islington, and in 1825, owing to the encroachment of London, a move was made to Croydon. In 1879 history repeated itself, and the School was again removed to its present situation at Saffron Walden.

After the address a detailed inspection was made of the main building, the swimming bath, sanatorium and grounds. The recent additions of a Chemistry Laboratory and Art Room and new class rooms were greatly admired.

The weather on Monday morning was by no means promising, but in spite of the signs the party left the Hotel at 9 a.m. in a motor char-a-banc and proceeded to Hadstock via Little Walden. A mile out of the town a halt was made to examine the remarkable gorge cut in the valley bottom by the Slade, which is rapidly deepening its bed. A gorge some 50 yards long and 20 feet deep has been excavated during the past thirty years and its extension is only retarded by a field bridge and cement apron, which is being rapidly undermined.

opportunity was taken to inspect the site of the contemplated new "North Circular Road," which is to cut across a corner of the Forest, and also to view a small piece of woodland near Sky Peals at Hale End, which is to be thrown into the Forest by way of compensation. Our member, Mr. Gerald Buxton, J.P., who is a Verderer of the Forest, acted as guide.

Some 50 members assembled at Snaresbrook Station at 2.30 o'clock, and proceeded under Mr. Buxton's guidance past the Eagle Pond and through Gilbert Slade to the neighbourhood of the "Rising Sun" Inn. Here a well-known Forest swamp, "Bullrush Pond," now pleasantly filled with rushes and other marsh plants, was pointed out, and we learned with regret that a scheme is afoot locally to "improve" this picturesque spot into an artificial, concrete-bottomed pond to meet the "aesthetic" tastes of some local vandals—of course at the expense of the natural amenities of the spot. It is to be hoped that the scheme may fail to mature.

Proceeding through the woodland and past the Waterworks, the course of the proposed new road was followed to Sky Peals: a small pond close to the road, and adjoining the new piece of woodland, delighted the visitors by a profusion of the beautiful Water Violet (*Hottonia palustris*) in full flower, all happily out of reach. The new woodland is of only some two acres or less in extent, but contains some tall spear hornbeams, which will be specially cherished by the fostering care of the verderers. The new piece of woodland is a typical "oak hornbeam" wood, and will form a valuable, although small, addition to the Forest. Continuing through the thick towards Oak Hill, a fine Wild Service Tree (*Pyrus torminalis*) in abundant flower was noticed—a glorious sight. A less-pleasing incident was an incipient Forest fire, well alight beneath a holly bush, no doubt the result of a careless visitor's thrown-down match; this was fortunately capable of being vigorously stamped out by Mr. Buxton. The defoliating caterpillars of various Tortricid moths were only too abundant, on, or hanging from, the oaks in this district.

Crossing the roadway at Oak Hill, some magnificent hawthorn bushes were noticed near the entrance to Higham's Park, each a mass of white bloom. The party proceeded through the Park, by the lakeside, and thence across Whitehall Plain to Woodford; where, at his residence in Snakes Lane, our honorary treasurer, Mr. John Avery, and Mrs. Avery, welcomed the party to afternoon tea on the picturesque lawn.

After tea a short formal meeting of the Club was held on the lawn, with the president (Mr. R. Paulson, F.L.S., F.R.M.S.) in the chair, when

Miss M. Meekings Johnson, of *West Ham Hall, Wanstead, E.11*, and

Mr. Johnson Shears Jeffree, of *the Metropolitan Water Board, Copper Mill Lane, Walthamstow, E.17*, were duly elected members.

The President proposed the cordial thanks of the party to our host and hostess for their kindly hospitality, and to Mr. Gerald Buxton for his leadership throughout the ramble.

Mr. Paulson referred eulogistically to the long services to the Forest rendered by Mr. Buxton and his father, Mr. Edward North Buxton, and evoked hearty agreement from his hearers, the double vote of thanks being carried by acclamation.

Mr. Avery briefly replied, expressing the pleasure his wife and he felt at welcoming the Club at their home.

The visitors afterwards spent a considerable time in inspecting the grounds, and our host's extensive collection of Essex books, prints, and other curios, which he has amassed during many years.

VISIT TO BOREHAM AND LITTLE BADDOW (549TH MEETING).

SATURDAY, 17TH JUNE, 1922.

Our members, Mr. and Mrs. A. E. Briscoe, having kindly extended an invitation to the Club to visit them again at Little Baddow, the opportunity was taken to explore a fresh section of this delightful countryside.

The party—a small one, owing to the unavoidable clashing of several interesting meetings affecting many of our members—assembled at Chelmsford railway station at 11 o'clock, when brakes were in readiness to convey it to Boreham. Here, at Messrs. W. Seabrook and Sons' fruit-nurseries, the visitors were welcomed by Mr. Seabrook and spent some considerable time in an inspection of the grounds and in hearing an explanation of some of the processes necessary to ensure a profitable crop.

A bush-specimen of the D'arcy Spice Apple excited considerable interest as being an Essex-raised apple of commendable flavour, though not now in much request. Considerable interest, also, was evinced in the growing crop of strawberries, which, at Mr. Seabrook's kind invitation, were freely sampled by the visitors.

The remains of the moated Tudor house, known as Toppinghoe Hall, in Messrs. Seabrook's occupation, with five old Cedars of Lebanon in what were once its grounds, were inspected and admired; little seems to be known of the history of the Hall, but we were informed that the tombs of its former owners exist in Hatfield Peverel Church not far away.

A specimen of the "Velvet Rose," an old damask-rose, which grew in Gerard's garden in Holborn, together with the first garden strawberries ever grown in England, was pointed out by Miss Willmott in the tiny front garden of a cottage, and may well have come from the now-vanished gardens of the old Hall.

Leave was here taken of Mr. Seabrook, the president expressing the thanks of the party to him for showing us the nurseries (not forgetting the strawberries!) and the Hall; and Mr. Seabrook suitably replied.

Following an *al fresco* lunch, Boreham Church was next visited. The Vicar, the Rev. A. E. Hall, was unfortunately unable personally to receive the party, but he had kindly prepared an account of the fabric, which was read by Mr. Briscoe to the visitors assembled in the church. Mr. Hall's notes are summarised as follows:—

BOREHAM CHURCH.

The central Norman tower is fairly intact, the walls at base being four feet in thickness: Roman materials, such as bricks, tiles, septaria, with flint pebbles laid in horizontal courses in the manner distinctive of Norman masonry in Essex, are used in it, and the tower windows are original, the upper belfry lights of two slightly-pointed openings, with central column,

under a containing arch, which is also pointed, marking a late stage of Norman work.

The 13th century Early English nave of four bays, separated by octagonal columns having curious capitals, had originally very narrow N. and S. aisles, part of which latter still remains at the west end ; both aisles were widened later, the date of the N. aisle (c. 1440), being evidenced by the dripstone corbel of one of its windows, which represents a female head wearing the characteristic horned head-dress of the period.

To the south of the 15th century chancel is the Sussex chapel, erected in 1583 by Thomas Radcliffe, Earl of Sussex, who owned New Hall, together with all the other Foreham manors, by grant from Queen Elizabeth in 1573. The chapel contains an elaborate altar-tomb with three male recumbent figures in armour, carved in alabaster, these effigies being those of Robert Radcliffe, died 1542, his son Henry, died 1556, and his son Thomas, died 1583. At the foot of each effigy is crouched a curious apeline figure, wearing a peculiar cap.

Leaving this interesting church the party made its way through the meadows to the Chelmer and rambled along its banks for some distance, noting the characteristic riverside plants ; then, retracing their steps, the visitors made their way to Little Baddow, which was reached shortly before 5 o'clock.

At "The Hoppet" Mrs. Briscoe and her daughter welcomed the party, and tea was served in the garden in the grateful shelter of large elms.

After tea the Little Baddow Parish Registers and Churchwardens' Accounts were exhibited by the rector, the Rev. J. Berridge ; and our host showed us the handsome two-handled silver communion cup, dated 1766, possessed by the old Congregational Chapel, and also another dated 1824.

A general inspection of the garden and fruit ground followed, masses of roses being everywhere in evidence.

Before leaving, the President warmly thanked our host and hostess for their kindly hospitality, and further expressed the thanks of the party to Mr. Briscoe for his leadership during the day's delightful ramble. Mr. Briscoe briefly replied ; and the conveyances having by this time arrived, leaves were taken, and the visitors were driven back via Great Baddow to Chelmsford, with ample time which allowed of a hurried glance at the exterior of the Cathedral before leaving Chelmsford by the 8.7 train for town.

FIELD-MEETING IN EPPING THICKS (550TH MEETING).

SATURDAY, 8TH JULY, 1922.

Following the recent inspection by the Club of the southern portions of the Forest, Mr. Gerald Buxton kindly invited the members to visit him at Birch Hall, Theydon Bois, and to inspect the northernmost portions of the woodlands under his guidance. The present expedition was the outcome of that invitation.

The party, numbering well over 40, assembled at Theydon Bois Station at 2.30 o'clock, and proceeded by way of the Green, and past the Church to the Forest, entering the woodlands at the back of "the Plain," which was teaming with thousands of noisily happy London children "down for the

day." Halting before some dwarf Hollies, which had been eaten off to a rounded outline by the deer, Mr. Buxton demonstrated how easily the depredations of these forest animals could be controlled, and a "leader" allowed to develop, by the simple expedient of thrusting a stout stick vertically into the centre of the bush, which served as a protection from these browsing animals.

Crossing the golf links in "Thames Valley," the party made its way to Epping Thicks, where two of the three larger unpollarded hornbeams of this part of the Forest were inspected with interest, and their girths at three feet from the ground taken, these being respectively, 5ft. 4in., and 5ft. 10in. These "spears," although of less girth than many of the surrounding pollards, are well-shaped, and promise, after further clearing, to become fine specimens; the opinion was expressed that they were probably 80 to 100 years old, and they have somehow escaped the almost universal pollarding that has overtaken their neighbours.

A recent clearing, which gives a charming view from the Epping Road down a stream-valley, into the heart of the woodland, was inspected and pronounced to be a distinct improvement of the scenic beauties of the Forest.

Ambresbury Banks, the ancient British camp, was next visited. Mr. Buxton informed us that modern Britons, in the persons of Boy Scouts, still frequent the camp and engage in sham conflict with poles upon its banks by night.

Rain now commenced to fall, and it was therefore deemed advisable to cut quickly across the Forest to Birch Hall, where the visitors were hospitably welcomed by Mrs. Buxton and tea was served in the Library.

After tea a short meeting of the Club was held, with the President in the Chair.

The Hon. Secretary said that before the business of the meeting was entered upon, he had to make the sorrowful announcement of the death of Mr. William Cole, founder of the Club, which took place on the 27th June. In the unavoidable absence of the President, Miss G. Lister, as a past-president of the Club, had attended, with himself, the funeral at St. Osyth on the preceding Saturday, and had deposited, in the name of the Club, a wreath upon our Founder's coffin. The speaker said it seemed strange, before members of the Club, to have to remind them of the work done in the past by our deceased Founder, but he realised that a new generation had arisen "which knew not Joseph," that some of them had been members for years and yet had neither seen nor heard of William Cole except by seeing his name bracketed with his own as a honorary secretary of the Club. He recalled briefly some of the former activities of the deceased, and traced his gradual breakdown in both bodily and mental health during the later years.

The President supplemented the former speaker's remarks, and asked those present to signify their concurrence with the suggestion that a letter of sincere condolence should be sent to the surviving brother of our deceased Founder, Mr. Henry Cole, in the name of the Club. This was agreed to in silence, the members standing.

The Hon. Secretary read a letter of thanks to the President and members of the Club, from Mr. Councillor Hughes, of West Ham, for the co-operation given in connection with the recent "Education Week" in that Borough.

The President proposed the thanks of the party to Mr. Gerald Buxton

for his leadership during the afternoon, and to Mrs. Buxton and him for their kindly hospitality. He referred appreciatively to Mr. Buxton's zeal in thinning the crowded portions of the Forest, and spoke of the enhanced beauty of the woodlands which had been due to his efforts.

The vote of thanks was passed by acclamation.

Mr. Buxton, in thanking the members for their kind vote, apologised for not having thinned the Forest sufficiently! He did his utmost, and would like to do more, but his hands were tied. Referring to Mr. Cole's death, he remarked that his father, Mr. Edward North Buxton, who was now 81 years old, had told him how strenuously and successfully Mr. Cole had defended the policy of thinning in the Forest in the early days of the Club, when ignorant persons sought to inflame public opinion against this enlightened action of the Verderers.

The grounds of Birch Hall were then viewed, under the guidance of our host and hostess. The rare grass, *Cynosurus echinatus* L. was noticed growing on a waste-heap in the grounds, and a specimen was taken for the Club's herbarium.

On the way to the station a cottage, which has come into Mr. Buxton's possession, and has been restored by him so as to bring to light the old oak ceiling beams, was inspected.

Leave was then taken of our host, and the 7 o'clock train caught for town.

NATURE-RAMBLE IN THE HUTTON DISTRICT (55th MEETING.)

SATURDAY, 23RD SEPTEMBER, 1922.

This field-meeting was an outcome of the visit paid, at the invitation of Mr. and Mrs. James Keeves, to their hospitable home at "Haslemere," Hutton Mount, during the summer of 1921. It was suggested on that occasion that an investigation of the extensive woodlands then traversed, if made in the autumn season, might be productive of good results as regards the Fungi, and an old-time reproach levelled at the Club, that its Fungus Forays were *always* held in Epping Forest, would thus be removed. Mr. Keeves, having whole-heartedly fallen in with this suggestion, and having renewed his invitation to the Club, the present meeting was arranged.

Some thirty members attended, and assembled at Shenfield Station at 11.21 o'clock.

Our host, Mr. James Keeves, was the topographical guide to the party; the President and Miss G. Lister jointly acted as referees in naming the wild flowers and fungi collected.

Some time was devoted to an exploration of the abandoned brickfield adjoining the railway line at Shenfield, and this proved to be overrun with wild plants and with a lesser number of garden plants run wild, and yielded many interesting finds.

Thrift Wood was then traversed, and, after a short cross-country walk, South Hove Wood, diligent search being made all along the route by the slowly moving party for botanical specimens. Lunch was consumed at an early stage, before the woodlands were entered.

Considering the late date, a surprising number of phanerogams was noted, no less than 135 wild plants, in actual flower, being recorded. Miss E. Prince, who undertook the duties of recorder, reports that the more interesting forms met with included *Melilotus officinalis*, *Linum catharticum*, *Hypericum quadrangulum*, *H. hirsutum*, *Angelica sylvestris*, *Helminthia echinoides*, *Erigeron acris*, *Solidago virga-aurea*, *Lycopsis arvensis*, *Erythraea centaurium*, *Lycopus europaeus*, *Scutellaria galericulata*, and *Epilobium angustifolium*. As regards the fungi, the success of the experiment in holding a foray in the neighbourhood was evident: over 60 species were identified, and when one bears in mind the comparative smallness of the party, and the short route traversed, this total appears a very satisfactory one. No great rarity was met with; and, as might be expected, most or all of the forms were identical with Epping Forest forms of frequent occurrence. The full list is as follows:—

<i>Amanita phalloides.</i>	<i>Hebeloma crustuliniforme.</i>
<i>A. muscaria.</i>	<i>Galera tenera.</i>
<i>A. rubescens.</i>	<i>Cortinarius cinnamomeus.</i>
<i>Tricholoma nudum.</i>	<i>Psalliota arvensis.</i>
<i>Russula alutacea.</i>	<i>Stropharia aeruginosa.</i>
<i>R. ochroleuca.</i>	<i>S. semiglobata.</i>
<i>R. emetica.</i>	<i>Anellaria campanulata.</i>
<i>Mycena galopoda.</i>	<i>Hypholoma fasciculare.</i>
<i>M. sanguinolenta.</i>	<i>H. lacrymabundum.</i>
<i>M. galericulata.</i>	<i>H. hydrophilum.</i>
<i>Collybia radicata.</i>	<i>Psilocybe semilanceata.</i>
<i>C. butyracea.</i>	<i>Coprinus comatus.</i>
<i>C. velutipes.</i>	<i>C. micaceus.</i>
<i>C. ambustus.</i>	<i>Boletus chrysenteron.</i>
<i>Marasmius peronatus.</i>	<i>B. scaber.</i>
<i>M. oreades.</i>	<i>Trametes betulinus.</i>
<i>Lactarius cilicioides.</i>	<i>Polystictus versicolor.</i>
<i>L. turpis.</i>	<i>Irpex obliquus.</i>
<i>L. controversus.</i>	<i>Grandinia grandina.</i>
<i>L. mitissimus.</i>	<i>Phlebia merismoides.</i>
<i>L. subdulcis.</i>	<i>Stereum hirsutum.</i>
<i>Hygrophorus coccineus.</i>	<i>Thelephora laciniata.</i>
<i>Clitocybe nebularis.</i>	<i>Clavaria inaequalis.</i>
<i>C. clavipes.</i>	<i>C. cinerea.</i>
<i>C. rivulosa.</i>	<i>Cyathus striatus.</i>
<i>C. fumosa.</i>	<i>Lycoperdon perlatum.</i>
<i>C. flaccida.</i>	<i>Ithyphallus impudicus.</i>
<i>Laccaria laccata.</i>	<i>Xylaria hypoxylon.</i>
<i>Omphalia pyxidata.</i>	<i>Calloria xanthostigma.</i>
<i>O. rustica.</i>	<i>Nectria cinnabarina.</i>
<i>Claudopus variabilis.</i>	<i>Mollisia caerulea.</i>
<i>Paxillus involutus.</i>	<i>Trichobasis suaveolens.</i>

Miss Lister identified the following mycetozoans:—*Physarum nutans*, *P. viride*, *Leocarpus fragilis*, *Stemonitis flavogenita*, *Comatricha typhoides*, *Trichia persimilis* and *Lycogala epidendrum*, the last occurring on leaves in a drying pool, a most unusual habitat.

At "Haslemere," which was reached shortly before 5 o'clock, the party was welcomed by Mrs. Keeves and her daughters, and tea was taken immediately.

After tea the President expressed the thanks of the party to Mr. and Mrs. Keeves for their kindly hospitality and for the former's leadership during the day's ramble.

Mr. Keeves briefly replied, and the vote of thanks was passed by acclamation.

The Hon. Secretary gave a short summary of the results of the day's explorations, and the visitors then adjourned for an inspection of Mr. Keeves's extensive garden and fruit-ground.

A pleasant, personally-conducted walk in the early dusk, back to Shenfield Station, in time to catch the 7.34 train to town, ended a most enjoyable outing.

FUNGUS FORAY IN EPPING FOREST (552ND MEETING).

SATURDAY, 14TH OCTOBER, 1922.

The Club's Annual Fungus Foray this year was memorable as being the first held in conjunction with the British Mycological Society; in addition, some members of the Gilbert White Fellowship, the School Nature Study Union, the South London Botanical Institute, the Toynbee Natural History Society, and the Croydon Natural History Society, were present by invitation, making a grand total of nearly 150 persons attending the Foray.

The conductors and referees were as follow:—

		Miss A. LORRAIN SMITH, F.L.S.
		Miss ELSIE WAKEFIELD, F.L.S.
<i>For the Basidiomycetes</i>	..	Mr. F. G. GOULD.
<i>For the Ascomycetes</i>	..	Mr. ARTHUR A. PEARSON, F.L.S.
		Mr. J. RAMSBOTTOM, O.B.E., F.L.S.
<i>For the Myxomycetes</i>	..	Miss G. LISTER, F.L.S.

and the headquarters for the meeting were, as usual, at the Roserville Retreat, Highbeach.

The route traversed by the morning party, which assembled at Chingford Station at 11.6 o'clock, was by way of Bury Wood, Cuckoo Pits and Fairmead Bottom to the High Wood at Highbeach; the afternoon party met at Loughton Station at 2.54 o'clock and worked the Loughton side of the Forest via Staples Hill, Loughton Camp, and the birch ground to the north, and so to Highbeach.

Contrary to expectation, the yields were less abundant than the unusually wet summer had promised, the dry spell of the past week having checked the profusion of fungi which had begun to evince itself earlier in the month; and, curiously enough, the lower ground of the Chingford portion of the Forest yielded less specimens, and those often of poor development, than the higher ground about Highbeach; nevertheless, the resultant show of finds at the headquarters was by no means a poor one.

The following basidiomycetes, found during the foray, are new records for Epping Forest:—

Tricholoma saponaceum Fr. var. *squamosa* Cke.

Russula atropurpurea (Kromb.) R. Maire.

Schizophyllum commune Fr.

Cortinarius (Dermocybe) mystillinus Fr.

Polyporus tephroleucus Fr.

Grandinia helvetica (Pers.) Fr.

Hypochnus subfuscus Karst.

Corticium botryosum Bres.

Peniophora pubera (Fr.) Sacc.

Peniophora incarnata (Pers.) Cke., var. *hydnoidea* (Pers.) Bourd and Galz. (= *Radulum laetum*)

Clavaria stricta.

Among other interesting forms exhibited were *Geoglossum glabrum*, *Hydnum coralloides*, *Lycoperdon caelatum*, *Clavaria pistillaris* and *C. fusiformis*. Two remarkably fine examples of *Armillaria mucida* were found growing on a pollard hornbeam, an unusual host plant for this beech parasite.

Tea was served at 5 o'clock at the headquarters; following which a meeting of the Club was held at which four candidates were nominated for election as members.

The President, in calling upon the several conductors for their reports on the day's finds, observed that that meeting—the first Foray organised in conjunction with the British Mycological Society—marked in his opinion a milestone in the history of the Club. He mentioned that year by year since the foundation of the Club in 1880, its Fungus Foray had been held (almost invariably in Epping Forest), and he spoke of the older mycologists—Worthington G. Smith, Dr. M. C. Cooke, George Massee, and others, now deceased—who had joined those forays and given their expert services in bygone years. He thought that mere collecting was not enough, the ecological study of the Fungi should be undertaken, and now that the British Mycological Society had joined forces with the Club, it seemed appropriate that some such intensive study should be inaugurated.

Miss Lorrain Smith, Messrs. Ramsbottom, Pearson and Gould, made some apposite remarks: Miss Wakefield, who was unfortunately suffering from a severe cold, was not called upon to speak.

Miss Lister said that her own especial protégés, the myxomycetes, had been exceptionally abundant that day, doubtless by reason of the week of fine weather following much rain, no fewer than 36 species having been recorded.

On November 21, 1896, at the Club's Foray, in the neighbourhood of Cook's Folly, Walthamstow Forest,¹ a rare myxomycete (*Badhamia rubiginosa* var. *dictyospora*) was found in the Forest for the first time, and had never again been recorded until to-day, when multitudes of its pinkish white sporangia, in perfect condition, scattered over a space of seven yards by four yards, had been found by Miss Greaves, covering fallen twigs and leaves: in some cases the plasmodium had surged up the hornbeam trunks themselves for some six inches and had there formed into colonies of sporangia. The full list of species found was as follows:—

Badhamia utricularis.

B. rubiginosa, var. *dictyospora*.

Physarum nutans with the var. *leucophaeum*, and var. *robustum*; abundant.

¹ The first occasion on which the Club had made the search for myxomycetes a special part of the day's programme. See ESSEX NATURALIST, ix., p. 250.—ED.

P. viride.

P. cinereum, on holly leaves.

P. compressum. Abundant on decayed bark of felled *Araucaria*,
High Beach.

Fuligo septicæ.

Leocarpus fragilis, abundant.

Craterium minutum. On dead holly leaves.

Diderma effusum. Very abundant on dead leaves and grass

D. spumarioides.

Diachea leucopoda. Weathered, on leaves.

Didymium squamulosum. On holly leaves.

D. nigripes. On holly leaves.

D. clavus. On rushes.

Stemonitis fusca.

S. ferruginea.

S. flavogenita.

Comatricha nigra.

C. typhoides.

C. pulchella. Old, on holly leaves.

Lamproderma scintillans.

Dictydiaethalium plumbeum. On fallen beech trunks.

Lycogala epidendrum.

Trichia varia. Abundant.

T. persimilis.

T. affinis.

T. decipiens.

T. botrytis.

Arcyria cinerea.

A. pomiformis.

A. nutans.

A. incarnata and var. *fulgens*.

Perichaena depressa.

On the President's motion a vote of thanks to the Conductors was passed by acclamation, and the Meeting terminated at 6.30 o'clock.

"Guide to Colchester," by W. Gurney Benham, F.S.A.

Benham and Company Ltd., Colchester, rs.

A new edition (the 15th) of this informative little guide has appeared. It contains over 120 illustrations, many of which did not appear in the earlier editions. The text has been brought up to date. We notice, for instance, that a short account, with plan, is given of the Roman vaults which have been recently discovered beneath the Norman Keep of the Castle. The Guide is a model of what such handbooks should be but often are not.

Ed.





WILLIAM COLE, A.L.S., F.E.S.
(1844—1922).

Founder of the Essex Field Club and for 42 years its principal Honorary Secretary.

WILLIAM COLE, 1844-1922.

AN OBITUARY.

TO but few people, not born to greatness nor with any special advantages of station, is it given to originate movements which will influence the lives of thousands of others and the effect of which will continue unabated after their own passing. William Cole may be counted among these few.

A chance meeting in Epping Forest in the late sixties of the last century, between two young men, each engaged in insect-hunting, began an acquaintance which was destined to ripen into lifelong friendship and, in the fullness of time, to the birth of the Essex Field Club, with its deep influence upon the scientific culture of the County. A poor photograph of this historic meeting, in the Club's possession, shows Raphael [afterwards Professor] Meldola and William Cole reclining on the ground beneath the Forest trees: Meldola's handwriting in pencil on the back of the photograph records this as "My first meeting with William Cole. Taken by W. J. Argent, in 1869. Epping Forest." Cole was at this time aged 25, Meldola was but 20 years old.

It is with William Cole's intimate connection with our Club, of which he was Founder and for 42 years the chief executive officer, that we are chiefly concerned here; his work is enshrined in the pages of this Journal, which he edited for so many years, and in the two Museums, at Stratford and in Epping Forest, which he organised and curated. The manifold activities of the Club in its earlier days were largely due to his initiative: we need only recall as specially worthy of remembrance the spirited stand made when a railway (of course, in the public interest only!) sought to encroach upon one of the fairest portions of the Forest by a proposed extension, and the action taken in opposition to the uninstructed outcry of a portion of the London press against the judicious thinning of the Forest trees by the Conservators. It will suffice to pass somewhat rapidly through the events of his earlier life.

Born at Islington, on February 11th, 1844, he was the sixth son of Mr. Julius William Cole, of Kimberton, in Huntingdonshire, an official of the Trinity House, and his wife Frances (née Love), a grand-daughter of John Love, of Crostwick Hall, North Walsham, in Norfolk. Besides William, his parents had seven

other sons and three daughters, some of whom died at a very early age ; but his brothers, John, Benjamin, and Henry, and his sisters Frances and Jane, were destined to be his almost life-long companions.

William's two elder brothers, John and Julius, were at boarding-school at Woodford, in 1852, and it was during visits to them that, at the age of 8 years, he first learned to know and to love the Forest with which he was to be so closely associated in later life.

His education was acquired at various private schools in North London according to the family's not infrequent changes of residence, and later he attended evening classes at King's College.

We are told that he was a studious lad, though not caring for school restraints, and he read scientific books with keen interest ; at an early age he showed intellectual superiority, which led him to give lectures on Physical Science and Natural History subjects to his admiring brothers and sisters.

In 1861 William, as a lad of 17, was sent into a shipbroker's office in Mark Lane.

The death of his father, in 1865, brought about a removal of the home from Tottenham to Islington, and two years later to Clapton. William now entered the office of Mr. Charles Browne, Barrister, of Lincoln's Inn, as shorthand writer, and stayed with him for some five years ; he afterwards joined the staff of a morning newspaper in the same capacity.

Though never a great lover of outdoor sports, William Cole was a keen cyclist in the early days, and he founded, with others, the first bicycle club in London. All through his life he was an ardent collector of butterflies and moths, as well as of plants and natural objects generally. Even in natural history pursuits, however, he preferred the more sedentary and intellectual task of arranging and naming the numerous specimens which his brother Benjamin (chiefly) went forth to capture.

At Stoke Newington, whither the family had now removed, the microscope occupied a large share of his leisure as a young man.

In 1877 another removal, this time to Laurel Cottage, Buckhurst Hill, brought the Cole family into more intimate connection with Epping Forest, and the way was thus prepared for the foundation of the Essex Field Club in the beginning of 1880.

The actual birth of our Club was the outcome of a chance suggestion made by a visitor to a local *conversazione* at Buckhurst Hill, held in the autumn of 1879, at which the Cole brothers exhibited their entomological collection. The seed fell on good soil; and that same night Cole wrote to Meldola and other entomological friends, proposing that they should start a local natural history society. From this proposal the Essex Field Club (or as it was at first called, the Epping Forest and County of Essex Naturalist's Field Club) was born.

From time to time other business activities claimed his attention.

In or about 1890 he was appointed Science Organizer and Curator by the Technical Instruction Committee of the Essex County Council, having his London office at 35, New Broad Street, and a County office at Chelmsford, where he could meet enquirers by appointment. Also, in 1891, or soon after, he became Secretary to the "Organising Joint Committee on Technical Instruction," formed by the Essex County Council and the Essex Field Club.

At the same address in New Broad Street he acted as Secretary to the "Suburban Districts Water Supply Committee," appointed at a Conference of extra-Metropolitan Local Authorities on the question of water supply, on Nov. 17, 1890.

William Cole was fortunate in having brothers and sisters—like himself unmarried, and living together in rare harmony—who not only shared his interests but were willing to further them wholeheartedly by their unselfish efforts. Never was there a more united, more devoted family, never was an elder brother more loyally served by his juniors. Indeed, we may not unjustly say that William Cole was not an individual, he was a corporation; for his life-work was the work not of himself alone (though he, as the directing spirit, obtained the chief recognition), but of the family, whose other members voluntarily effaced themselves behind the striking personality of "brother Will"; to whom in all things they deferred, recognising in him the genius of the family group. His was to plan, theirs, largely, to carry out: his to design, theirs to perform the necessary hodwork without which the design could not materialise. To scheme for the future was, indeed, characteristic of William Cole, sometimes, it must be confessed, to the prejudice of the work actually in

hand. A lack of concentration on the work of the moment, while mentally absorbed in far-reaching plans for future developments, may not unjustly be laid to his charge. In such junctures, the loyal unseen co-operation of his devoted brothers and sisters was an invaluable asset; but for such service many of his schemes would have been stillborn.

Cole was elected a member of the Entomological Society in 1873; and he remained a Fellow of that Society until his death. In 1896 he was elected a Fellow of the Linnean Society, and was transferred to the Associateship of the Society in 1910.

The number of scientific papers written by William Cole is not large. The routine work of the principal honorary secretaryship of the Essex Field Club, and the somewhat onerous tasks imposed by the editorship of its Journal, left little leisure for original research. His chief claim to the recognition of the scientific world, and, on the part of members of our Club, to their affectionate remembrance, is the organising ability which founded the Club and which "enthused" so many influential men to give the young society their personal support, and the loyalty which always placed the interests of his offspring in the front rank. Our Club was, indeed, an obsession of its Founder; it was regarded almost as a private possession; and the present writer is in a position to assert that its welfare became more and more the subject of his anxious pre-occupation.

Early in the year 1910, Cole experienced a serious nervous breakdown, from which he never completely recovered. A grant from the Royal Society, obtained through his old friend, Professor Meldola, enabled him to travel abroad for a short while, and the change of surroundings, inducing a corresponding change of thought, effected a temporary re-establishment of his health; but he aged perceptibly; and a recrudescence of his illness in 1916 proved to be permanent, and henceforth, he was compelled to relinquish participation in the many activities which had, hitherto, engrossed his attention. The outbreak of the Great War, and the consequent shattering, as it seemed to him, of all his ideals, affected him gravely: and the gradual loss, by death, of many of his old friends, and of his brothers and sisters, served still further to aggravate his malady.

In 1919, through the influence of powerful men of science who were acquainted with his work, Cole was granted a Civil

List Pension of £50 per annum, "in view of his contributions to the study of natural history and to scientific education, and of his old age." With this, and a further annual pension of £75, raised by subscriptions from friends and administered by a Committee of the Council of the Essex Field Club, he was able to spend the last few years of his life in retirement at St. Osyth, where, in a Martello Tower, on the Essex shore, he and his brothers and sisters had for years past made their home.

During the last few months he sank into a semi-comatose condition, scarcely heeding what happened around him, and towards the end needing to be tended like a child by his sole remaining brother Henry.

He passed away on June 27th, 1922, in his 79th year, and was laid to rest in the cemetery at St. Osyth.

William Cole was of commanding presence. Stout in build, and with massive head and full face with deep-set eyes—the face of a thinker—he struck the observer with a sense of dignity which inspired respect, and made one conscious that his was a personality of an uncommon order.

With his social and religious views we are scarcely concerned here. In politics he was an avowed Socialist of the mild Fabian type; and he maintained communion with the Established Church until his decease.

There is one phase of Cole's character upon which we wish to touch very lightly. It has been thought that he was a difficult man to work with, intolerant of opposition, and that his many helpers in the Club's affairs were sooner or later repelled by his brusqueness: in this connection, the present writer need only adduce his personal experience. During sixteen years of close official contact with Cole, once only did any disagreement arise, and a feeling of soreness develop, and it should be said that, when the cause of the difference was explained, no more warm-hearted, generous apology could be desired than was spontaneously offered by the subject of this memoir.

In conclusion, no better summing-up of William Cole's life-work can be given than that expressed by Mr. E. N. Buxton, in a letter written on receipt of the news of his death, and which we are permitted to quote. "He taught many people to use their eyes and gave a new interest in life to many more. Essex owes him a great debt."

P.T.

THE COLE COLLECTION OF BRITISH LEPIDOPTERA.

By A. W. MERA.

[Read 28th October, 1922.]

I HAVE been asked to report on the extensive collection of British Lepidoptera made by the brothers Cole, which has been bequeathed by the late Mr. William Cole to the Essex Museum.

All collections of this size made by private individuals necessarily entail life-long study and labour, and possibly none but the entomologist fully appreciates what an absorbing pursuit the collecting of insects becomes. It was not my good fortune to know the brothers Cole personally, but I can clearly see by the painstaking manner in which the collection has been compiled that they were enthusiasts who spared neither time nor trouble in acquiring the objects of their pursuit.

I will endeavour to make some remarks on a few of the species contained in the collection which are to my mind of special interest. The collection is named practically from Doubleday's list, which I will not attempt to alter. The old names still retain the distinct advantage of being understood by all collectors, and for me to attempt to be up-to-date in nomenclature would mean signal failure. It must be understood that I am not attempting an inventory of the collection, but only picking out a few species or specimens that may be of special interest.

There is a specimen of *Pieris brassicæ* with the spots on the fore wings connected by a slight dusking of black scales. This, of course, is a minor variety, but many seasons may pass without a similar one being taken. Then there is a very fine series of *Colius edusa*. Many of them were taken in the year 1877, the great *Edusa* year. The localities given would be no guide to young collectors, for the insect occurred in that year where it was never seen before and probably where it will never be seen again. The real home of the insect is in the south-eastern counties, and in those parts it is usually seen each year, but in greatly varying numbers.

Leucophasia sinapis is another interesting species represented in the collection by a long series from the New Forest taken in the years 1874 and 1876. This insect is by no means one of our rarities, although it has long since vanished from the County of Essex, where it occurred many years ago. Doubleday records it from Epping Forest in his young days, and in an old collection of lepidoptera examined by the Rev. G. H. Raynor, there was a specimen of *Sinapis* taken at Chelmsford in 1840. In 1915 I was told by one of the keepers in the New Forest that *Sinapis* had not been seen there for many years, although its food plant

was still there. In fact the disappearance of this species from many of its southern localities has been most marked and unaccountable.

Pararge Egeria is apparently another of our lost Epping Forest species. The specimens in the collection were taken in Epping Forest in the years 1874 and 1890. Personally, I was rather surprised to see so recent a date for the insect as 1890, as I believe the last I saw in the Forest was in 1868, but in my early collecting days I was only an occasional visitor there, so that my records would naturally be imperfect.

Some few years ago, the late Professor Meldola wrote an article in the *Entomologist*, on the disappearance of the Satyridæ from the London district, which I certainly agreed with in every detail; yet within the last few years one species at least has returned in full vigour, that species being *Pararge megæra*. For many years I never saw a specimen within 12 miles of London; now for the last three years I have seen them at Loughton. This insect has not only returned to our Forest, but after a long period of scarceness has once again become one of our common southern insects. It is not entirely the growth of population which exterminates the insect fauna of a district, and we have to look for some more subtle influence in either climatic conditions or parasites. There is a nice specimen of *Epinephele janira* with bleached wings. This form of variation is generally attributed to some injury or unfavourable condition during the pupa stage. Another of the Satyridæ which apparently has gone from Epping Forest is *Tithonus*. There are specimens of this species in the collection from Epping Forest, and also others from St. Osyth, which have additional spots on the fore wings. This spotted form occurs in some abundance in South Devon, but it is unusual in the Home Counties.

Limenitis Sibylla is another interesting Essex species. Although the series in the collection is mostly composed of New Forest specimens, there is a single example from St. Osyth, taken in 1912. Apparently St. Osyth has been the home of this insect for many years past. At the present day it is to be found in some abundance in the woods to the south-west of Ipswich, and in my early days I was frequently told, by old collectors at Ipswich, that *Sibylla* had been imported into these woods from St. Osyth by a man named Seaman, of Ipswich, probably as far back as 1845. It very soon established a strong hold in its adopted country, which hold has been retained until now. My last captures in these woods were in 1919.

In the series of *Vanessa cardui* there is a very fine variety with all the usual markings entirely altered. The specimen is almost identical with an illustration of a variety in Edward Newman's *British Butterflies*. This was in the collection of Mr. Ingall. The two are so alike that they might be the same

specimen, but apparently the one before us was taken in Epping Forest in 1879, whereas Newman's book was published in 1871.

There are the two small fritillaries, *Argynnis selenæ* and *A. euphrosyne*, both taken in Monks Wood, Epping Forest, in June 1878. As far as my knowledge goes both these species have gone from the Forest without any apparent reason; nevertheless they are common enough in most woods in the South of England, especially *Euphrosyne*.

There is a nice series of *Melitæa athalia* taken in Chattenden Wood, North Kent, in the year 1874. This is another of our disappearing British butterflies. It has probably gone from Chattenden since about the year 1878, and from the woods round Colchester at an even earlier date. I was recently told by Mr. Harwood, the well-known entomologist, that his father used to take the insect in all the woods between Ipswich and Colchester, when a young man, but at the present day there is not one to be seen in any of them. However, the insect seems to have taken a new lease of life in some of the woods of East Kent, the exact locality not being known to me, but I have ample evidence that it occurs in numbers. Possibly in time it may re-occupy abandoned territory in Essex.

Thecla betulæ was for many years one of the special butterflies of Epping Forest. The series in the collection was taken in 1868 and 1875. I think it was in the year 1897 that I heard of the last being taken in the Forest. For the last eight years I have made efforts (possibly somewhat feeble) to beat out the larvæ, but without success. In the year 1881, on Staples Hill, in the Forest, I took it in fair abundance. It is difficult to account for the disappearance of this insect.

Turning to the "Blues" there is a nice variety of *Icarus* (underside) taken in Epping Forest in June 1872, and a very interesting series of *Ægon* including a fine gynandromorph specimen, all taken at High Beach in 1868. This is yet another species which has left Epping Forest, and like that of so many others its absence would rather point to the contaminating influence of smoke than to anything else.

Perhaps some remarks may be made concerning the two "Skippers," *Hesperia linea* from Epping Forest, and *H. lineola* from St. Osyth. The latter, although known on the Continent, was first discovered as a British species by Mr. Hawes, on the coast of Essex, near Shoeburyness, in 1888. For a long time it was thought that we only possessed the one species *Linea*; in fact an entomological friend of mine, who had collected in Essex some twenty years before 1888, found, when examining his series of *Linea*, that some were really *Lineola* and they had been resting in his cabinet for years unnoticed. In many ways the habits of the two species are very similar, and on the Essex marshes they are frequently taken flying together; but the range of

Lineola seems pretty well confined to the Essex coast and both sides of the Thames as far as Mucking on the Essex side, whereas *Linea* is found throughout the South of England; but I am afraid it must be numbered among the disappearing species of Epping Forest.

Passing to the moths in the collection I was struck with the very fine and strongly marked series of *Chærocampa porcellus* from St. Osyth, taken in 1912. These appear to me to be unusually bright.

Then we have *Macroglossa bombyliiformis* and *M. fuciformis*, both taken at Highbeach in 1870 and 1871. These are interesting captures, and as far as I know they have not been taken in the Forest for some years past.

In a nice series of *Arctia villica* there are three conspicuous examples from St. Osyth taken in 1895; they have some of the cream spots confluent at the base of the fore wings. I have seen somewhat similar specimens from the neighbourhood of Dovercourt, and it would seem that this form of variation is more frequent along the Essex coast than elsewhere. There are also some light and dark forms of *Caja*, but I should say that these have no bearing on local variation.

There is an interesting specimen of *Spilosoma lubricipeda* approaching var. *fasciata*, taken at Clapton in 1868, and a specimen of *Menthastri* taken at Wanstead in 1877 with smoky tips to the wings, and a somewhat similar form from Stoke Newington taken in June 1874.

There is also a nice series of *Psilura monacha* from Black Bushes, Epping Forest, taken in 1874. It would be too hazardous to say that this species has gone from the Forest, although I have never seen it there.

Trichiura cratægi is another insect, represented in the collection by specimens from Epping Forest, which has apparently left the district.

There is a particularly fine dark *Bombyx quercus* ♀ from East Mersea, and another from Witham, but these varieties can hardly be considered as local variations, as usually the darker specimens come from the North.

Then there is a nice light variety of a male *Odonestis potatoria* from East Mersea. These occasional light forms of ♂ *potatoria* I have usually found in more or less marshy districts and I have looked upon them as an example of protective colouration, as the light forms would be much better protected while resting on the reed stems than would the typical dark form. There are some very fine forms of *Saturnia carpini* from St. Osyth, the specimens being considerably larger than those of the same species from the North. This large Essex race is well known to entomologists. I recently saw some fine examples, bred some years ago from the Lea Valley.

Among the Noctuæ there is a series of 7 *Acronycta auricomæ* taken in Balcombe Wood, near Brighton, but without date. This insect has either been absent from Britain or particularly scarce for some years past.

A series of *Dicycla Oo* from Epping Forest was taken in 1870-71 and 72. Although this insect has apparently disappeared from the Forest, it has always been noted for its erratic occurrence, and I see no reason why we should not see it again in the Forest if conditions become favourable. There is a very nice specimen of *Catocala nupta* with pale red underwings, from East Mersea

The Geometridæ are well represented. Among some of the more conspicuous is a series of *Angerona prunaria* from Epping Forest, comprising most of the known forms, and some with only slight indications of a band, which is unusual.

Some of the specimens of *Nyssia hispidaria* taken in Lords Bushes, Epping Forest, in 1902, show a decided melanic tendency, as also do two specimens of *Biston hirtaria*, taken in the Forest in 1904. *Amphidasys prodromaria* is represented by some very fine as well as somewhat dark specimens, but *Betularia* specimens from the Forest are typical. These I should conclude were not recent captures, as at the present day there are many more of the black form, *var. Doubledayaria*, in the Forest, than there are of the typical speckled form.

Then we have a long series of *Tephrosia biundularia*, taken in the Forest from 1868 to 1904, which are all of the typical form. This species, as all entomologists know, is very much given to melanism in the neighbourhood of manufacturing districts; it was not until May 1918 that I took a melanic specimen in our Forest. It is difficult to account for the darkening of certain insects at the present day, but it is an undoubted fact, and the fact is emphasized when looking through a collection of this kind, which was largely obtained some 50 years ago.

There is yet another very unusual capture to note, and that is *Sterrhæa sacraria*, taken by Mr. B. G. Cole, near Chigwell, on 19th August 1879. This species is described by South as a migrant, but in view of the fact that many of the recorded captures have been inland, I should incline to the opinion that the species is absolutely British, but that its habits are still very little known.

It only remains for me to congratulate the Club on the acquisition of such an extensive and interesting collection.

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Vol. XX.—Part IV.]

[APRIL 1923—SEPT. 1923.]

The *Essex Naturalist:*

BEING THE JOURNAL OF THE

ESSEX FIELD CLUB.

EDITED BY PERCY THOMPSON, F.L.S., *Honorary Secretary*

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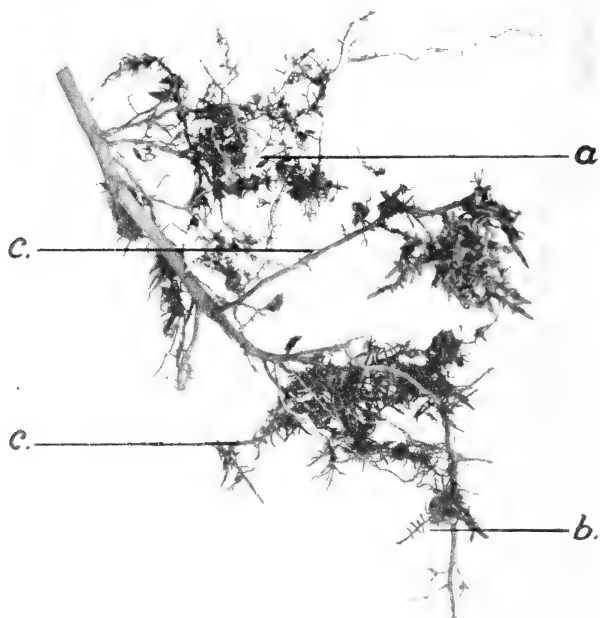


FIG. 1.

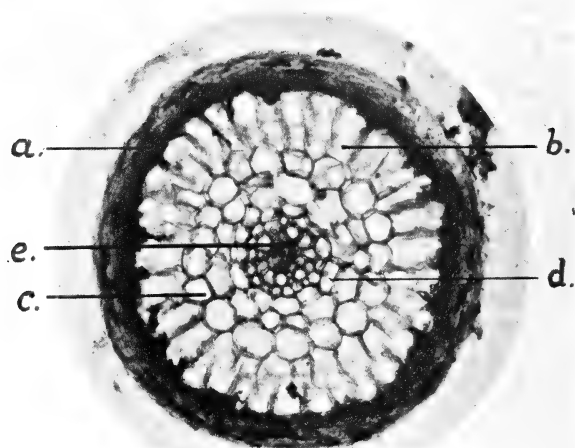


FIG. 2.

THE FUNGUS-ROOT (MYCORRHIZA).

Being a Presidential Address delivered to the Club at the Annual Meeting on 24th March, 1923.

BY R. PAULSON, F.L.S., F.R.M.S.

(With 3 Plates).

ONE of the time-honoured functions of the Essex Field Club is the autumn fungus foray, which has been held annually in Epping Forest since the club was inaugurated in 1880.

At the ordinary meeting, held in connection with the foray of 1922, the suggestion was made that it is advisable, in addition to the systematic work, to attempt some investigations having a biological, ecological and even economic bias, and further, that one indoor meeting, devoted entirely to fungi, might be arranged each year just previous to the autumn outdoor gathering. At the foray itself, the specialist has little time in which to explain matters ; the energies of the day are directed towards collecting and arranging in systematic order for the purposes of exhibition, hence the advantage of an indoor meeting before, or shortly after, the annual foray.

Fungus forays, having been organised annually for forty-two years in succession, have enabled the Club to record the Forest fungus flora in its many aspects, resulting from varied weather conditions, not only those conditions existing during the few weeks immediately before the foray, but those that marked the character of the weather for the whole previous year. The listing of species has been so thoroughly carried out with the invaluable aid of many mycological experts, that there is little prospect of adding many more of the larger fungi, Basidiomycetes and Discomycetes, to the flora. This does not mitigate in the slightest degree against the continued holding of the foray annually. There is every reason for carrying it on in the future as in the past, for it is only in connection with this well tried scheme that the additional, somewhat broader outlook will receive the impetus that engenders progress.

At each autumn foray the destructive character of the white slimy agaric, *Armillaria mucida*, is apparent among the beeches, trees, formerly magnificent, in the grip of the fungus, affording striking examples of the destructive work that is always in progress. This fungus, as it appears in its sporophore stage, is always attractive on account of its pure white colour, and it excites more than a passing interest when it is realised as being the cause of the destruction of much valuable timber and as rendering less attractive the sylvan beauty of the beech wood by leaving the slain giants of the forest strewn upon the ground.

Another widely known tree-destroying agaric is the honey fungus, *Armillaria mellea*, which attacks, in the first place, the roots of trees and does great damage to both root and trunk before the true nature of the attack is suspected. The spore-bearing toad-stools of this parasite appear at the base of the infected tree. It has been stated that more trees die in Europe from attack by this fungus than by any other parasitic agent. The whole progress from infection to the resulting death is an interesting story. The result of the attachment of this fungus to the tuber of an orchid *Gastroidea*, widely distributed in Japan, is perhaps of greater interest as a case of romance in plant life : indeed it is not until the hyphae of the fungus pierce the cells of the tuber that the orchid is stimulated into flowering.

Other fungi, that are among those most frequently exhibited after a foray, are the fly agaric, *Amanita muscaria*, *Boletus scaber*, and the common earth-ball, *Scleroderma vulgare*. Mycelial threads of these fungi attach themselves to the smallest of the root-branches of forest trees, but the attachment is by means of a thread so fine that the actual connecting point between the spore-bearing portion, which is formed above ground and the slender root, is not often easy to demonstrate. The sporophore may be several inches from the rootlet ; mycelial threads can be very easily broken, and lost sight of entirely, in removing the decaying leaves and soil through which they pass. When the mycelial threads reach the rootlets they completely surround them and by growth and much branching cover them with a mantle, so closely woven in certain forms, that threads lose their individuality and resemble in section a parenchymatous

tissue. This attachment of fungus to root does not kill the tree, we are not sure that it does any harm, it may indeed be of considerable use to it. The immediate effect upon the root is an arrest of the growth in length with more frequent branching, that is, the formation of a fungus-root. The actual inception and development of a fungus-root is not easy to follow. This close association of the two organisms is generally regarded as a form of symbiosis.

Eighty-two years ago Link observed fungi in the seedling protocorm of an orchid, *Goodyera procera*, but he did not realise that the substance was fungoid. It was not until seven years afterwards, in 1847, that Reissik recognised fungi in the roots of orchids and other plants.

I do not propose to give a historical resumé of the progress of knowledge respecting the fungus-root, as the literature of the subject up to so recent a date as 1922 is cited in an article, entitled "Orchid Mycorrhiza,"¹ by J. Ramsbottom. Although this article treats particularly of orchid fungus-root the references are not restricted entirely to papers concerning these plants. It will be, however, convenient to note the three Periods in the study of the fungus-root as recognised by Gallaud.² They are :—

FIRST PERIOD 1840–1885. Very little detailed work was described at this early stage. Writers recorded the fact that fungi were in several instances found closely related to the roots of various plants.

SECOND PERIOD 1885–1894. It was during the first year of this period that A. B. Frank³ made known the results of his researches on the fungus-root. He introduced the term mycorrhiza to describe it, and he further differentiated two forms of mycorrhiza. In one the fungus threads penetrate below the epidermal tissues and enter the cells of the root to which they attach themselves, in the other, the hyphae form a mantle around the root. The first form he designated as endotropic mycorrhiza, the latter as ectotropic mycorrhiza. These two forms are not distinctly separate, for it is now known that in the second

1. Ramsbottom, J., "Orchid Mycorrhiza." *Brit. Myc. Soc.*, vol. viii., pp. 28–60, 1922.

2. Gallaud, F., "Etudes sur les mycorrhizes endotropes." *Rev. Gén. Bot.*, xvii., pp. 5 *et passim*, 1905.

3. Frank, A. B., "Ueber die auf Wurzelsymbiose beruhende Ernährung gewisser Bäume durch unterirdische Pilze." *Ber. d. deutsch. bot. Gesell.*, pp. 128–145, 1885.

of these the hyphæ often force a passage between the cortical cells and sometimes enter them.

THIRD PERIOD 1894-1904. During this time the most important papers were mainly of two kinds, systematic and cytological: writers treated almost entirely of the endotropic forms and chiefly of those associated with the roots of orchids. Numerous theories were advanced respecting the relation between the flowering plant and the fungus. The reason for investigation being centred upon endotropic mycorrhiza is not surprising, it was associated with plants that were highly valued and that were, at that time, most difficult to raise from seed.

From 1904 onwards the number of writers increased rapidly. Papers on endotropic forms were still the more numerous but ectotropic mycorrhiza were not entirely neglected.

It is with the ectotropic fungus-root, and particularly with that of the birch-tree, that I have been interested for the past three years.

Mycorrhiza have been reported as occurring on the following trees, shrubs and ground plants of our woods and forests, viz.:—Oak, beech, hornbeam, birch, aspen, ling, whortle-berry, spurge laurel, arum, Paris and bluebell. Those of forest trees are mostly ectotropic. Birch mycorrhiza are remarkably abundant, especially on the roots of trees that are growing on a light soil with a top layer of decaying leaves. In most cases that I have examined there were very few rootlets that were not fungus-roots, and yet birch is frequently omitted from the list of trees that bear mycorrhiza. This is owing to the fact that Frank in his first paper, April 1885, included the following paragraph "It is not superfluous to mention that numerous other plants growing in woods were examined, herbs, shrubs, trees, but birches, alders, ashes, elms, were all devoid of the fungus." In a second paper, however, in answer to criticisms, published November 1885, Frank includes the birch among the trees bearing fungus-root. This paper has been evidently over-looked by writers who omit birch from their lists of forest trees bearing mycorrhiza.

At the time of writing, March 1923, one is able, on removing a thin superficial layer of decaying leaves, to expose under birches a network of root-fibres, of so fine a mesh that it is hardly possible to put the end of an ordinary lead pencil between the meshes without touching one of the boundaries. Mycorrhiza are

abundant. It is perhaps well to note that during the past six weeks (February—March 1923) there has been an abnormal fall of rain and very slight frost in the south eastern counties. This may account for the abundance of mycorrhiza. A remarkable phenomenon was witnessed by members who were present at the Club's Moss Foray on March 17th, 1923. In a hollow of considerable size where beech leaves had accumulated there was, within an inch of the surface of leaves, a complete carpet of mycorrhiza, several layers in thickness. Not a single rootlet appeared to be in a normal condition. The exact dates given above are of some importance for we have not yet sufficient data as to the length of life of mycorrhiza after once being formed.

McDougal,⁴ in describing the result of his investigations, writes, "The primary object from the beginning was to work out the seasonal relations of the mycorrhiza of our forest trees." "Both ectomycorrhiza and endomycorrhiza are normally annual. They are formed during the summer, reach their fullest development in late autumn, persist unchanged throughout the winter, and die in the spring."

The climatic factor appears to be the chief determining one in causing the changes stated above.

To obtain the mycorrhiza of a birch tree that is growing in its customary oak-birch-heath association, all that it is necessary to do is to remove carefully to the depth of from one to two inches the upper surface of accumulated dead leaves, in which the slender root system of the tree is always present.

Mycorrhiza break off very easily, part with the moisture they contain, and shrivel, becoming almost unrecognisable, on being exposed to an atmosphere that is at all dry. It is advisable, therefore, not to put them into a vasculum with other plants. They should be packed in wet moss or put into water in wide mouthed bottles of two-ounce capacity. If at the time of collecting they can be rinsed in a pool or stream of slowly running water, characteristic points, that it is important to know, as colour, shape and size, may be ascertained at once. Other methods are required when collecting from trees having a deeper root-system, such as oak and hornbeam. With these the soil has to be removed little by little to prevent undue injury. A recent writer recom-

4. McDougal, W. B., "On the Mycorrhiza of Forest Trees." *Americ. Journ. Bot.*, i., pp. 51-74 (4 pls.), 1914.

mends a shovel, but as it is not possible to use such a tool in Epping Forest or in other woodlands to which there is access, different means must be employed. It has been possible to collect mycorrhiza with the aid of a small trowel or scout's knife from those trees that grow on a bank which slopes rapidly in one direction, for in such situations roots are often conveniently near the surface.

On holding up to the light a bottle or tube containing fungus-root which has been rinsed in water, a large number of hyphal threads can be easily seen by the aid of a hand-lens of a magnifying power of X6 or X8. Besides the attenuated threads, many others of greater thickness and broad bands of fungoid substance are visible. The humus in which mycorrhiza flourish is thoroughly permeated with the hyphæ of many kinds of fungi.

Hyphæ attached to fungus-roots vary in colour from white through yellow to brown, and the mycorrhiza which they form are, when young, of a corresponding shade.

The number of fungi that are known to form mycorrhiza is small. Peyronel⁵ states that "The total number of Basidiomycetes forming fungus-roots is a little less than twenty." He especially mentions *Amanita muscaria*, *Lactarius necator* Pers (= *L. turpis* (Weinm), Fr.), *Boletus scaber* and *Scleroderma vulgare* as fungi which form mycorrhiza on the silver birch, *Boletus chrysenteron* and *Scleroderma vulgare* as forming them on beech, and *Boletus rufus* (Schæff) Quél. (= *B. versipellis* Fr.) on the aspen. All of these, with the exception of the last-named, are quite common in Epping Forest. They are exhibited on the tables at every foray. Noack⁶ found five species of agarics that were apparently mycorrhiza producers on the forest trees in the locality where he made his observations; two were *Tricholomas* and three *Cortinari*.

Mycorrhiza are not suitable for herbarium purposes, but they can be preserved satisfactorily in formalin.

After reaching home my gatherings have been washed in slowly running water. This removes loose soil and decaying vegetation without unduly breaking hyphæ from the points of attachment.

For further investigation microtome sections are necessary.

5. Peyronel, M. Beniamino. *Bull. Trimes. de la Soc. Mycol. de France*.

6. Noack, R., Ueber Mycorrhizenbildende Pilze, *Bot. Zeit.*, 47, p. 389, 1889.

A useful method is to place small portions of the material bearing mycorrhiza in a chromo-acetic fixing solution for two to three days, and then to proceed by the usual method to cut them in paraffin wax.

Sections from birch mycorrhiza may be taken as typical of the ectotropic form. They are comparable with diagrams of transverse sections of the fungus-root from other trees, but actual diagrams of the birch are not available so far as I am aware.

A transverse section of typical mycorrhiza has a diameter of .35 mm., it exhibits a series of three concentric circles, the outer of which, the mantle, consists of hyphæ so closely compacted together that they appear as a pseudo-parenchyma, the outer surface of which is smooth. Very few hyphæ of our type project into the soil; the thickness of the mantle is approximately .04 mm. Immediately under the mantle is a complete circle of thin-walled cells that are in section oblong radially, followed by others that are hexagonal. Next within these is the endodermis of the root structure with walls thickened tangentially and radially, a small amount of transfusion tissue being present. The central cylinder consists of plates of xylem in the form of a cross, tetrarch arrangement, with intervening phloem. The pericycle is not clearly defined. Sections taken from other mycorrhiza differ greatly in respect of the mantle, and in the circle of cells immediately under it. The endogenous origin of the branch of a fungus-root is seen in the transverse and longitudinal sections. Longitudinal sections often show more distinctly than the transverse the hyphæ of the mantle that have forced their way between the cortical cells. Root hairs are not present after the mantle is complete.

It is stated that mycorrhiza are not always formed on the rootlets of the young seedling, the oak not bearing them until the second or third year of growth. The birch and hornbeam bear mycorrhiza almost as soon as the lateral rootlets are formed.

Birch roots have mycorrhiza of four kinds, judging from size, kind of branching, colour, and the appearance of the outer surface of the mantle, they are :—

- (1) Brown, coralloid but somewhat lax in the branching; diameter .35 mm.; fungoid mantle smooth, with

- wax-like appearance when wet, resinous when dry, diameter of hyphal thread .06 mm. Radially elongated cells form a complete circle under the mantle.
- (2) Brown, branches approximately distichous ; diameter .4 mm. ; exterior of fungoid mantle smooth. Radially elongated cells form an incomplete circle.
 - (3) White in colour, coralloid branches short ; diameter .5 mm. ; fungoid mantle shaggy with loose hyphae. No radially elongated cells.
 - (4) Yellowish-brown, branches often shorter than the distances between them, widely scattered, mostly unilateral ; diameter .3 mm. or less, fungoid mantle more or less shaggy, attached to the finest attenuated rootlets.

The above descriptions must be considered as approximate only for average mycorrhiza, for it is apparent that the fungus-root is considerably modified by the temperature and rainfall at the time of its formation.

It is interesting to note that the stigmas of the birch flower remain upon the fruit until it falls in September, and even until the seed germinates. Before its fall hyphal threads are present, twisted around the separate styles and passing in loose coils from one to the other. The presence of the fungus there is not easy to explain. It was noticed on a very large percentage of the fruits in September, 1921, at the end of a phenomenal drought, so that from the first it was quite clear that it is not there as the result of a period of very damp weather. The explanation that suggested itself was, that the fungus was living on the tissues of the style, but one could not altogether disregard the fact that on germination the radicle would have to pass between the hyphæ on emerging from the seed-coats.

Seeds germinating under observation have revealed exactly what takes place, for after the radicle has passed through the hyphal barrier, the hypocotyl, which is studded with a multitude of minute hooked processes, all pointing in the direction of the growing point of the root, that is, downwards, follows. Some of these hooks catch on the hyphal threads and carry them to the upper surface of the soil. At the point of junction of the hypocotyl and the radicle there is an accumulation of hyphæ belonging to various species of fungus, among which are those that have

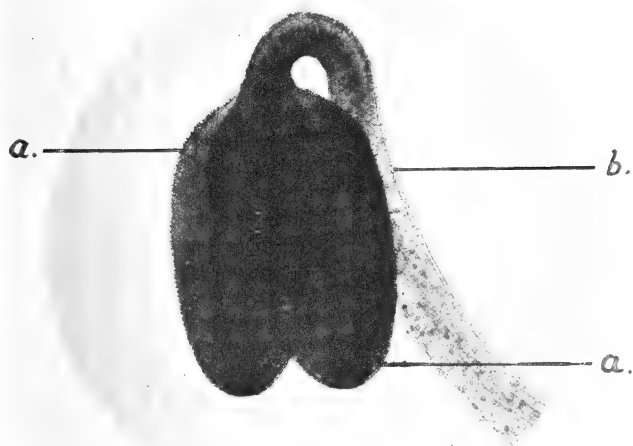


FIG. 1.

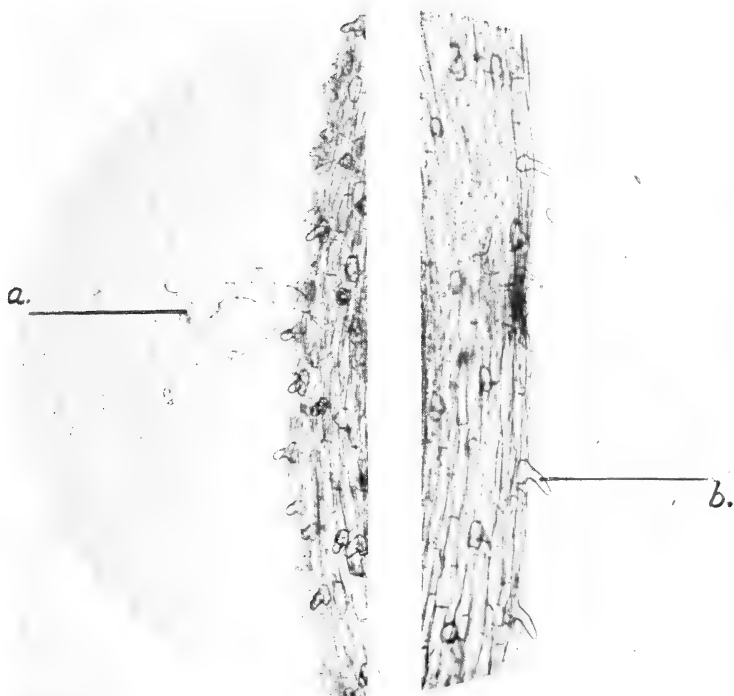


FIG. 2.



FIG. 1.

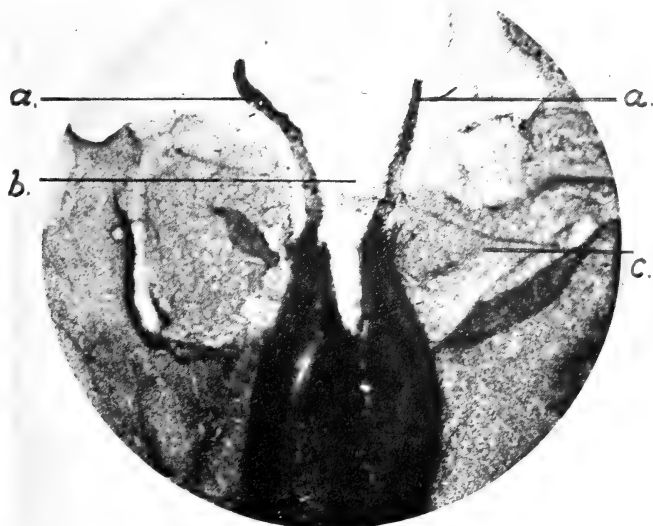


FIG. 2.

been brought down by the hooked processes. It is possible to find scattered portions of the hyphal threads that were around and between the two styles at different points along the hypocotyl. The fungus is not difficult to identify as such. It has a diameter of 2 to 2.5 μ , is frequently septate, with cells 15 to 18 μ in length. It is stained in a few minutes by a solution of cotton blue in lactic acid. The fungus has not so far been traced below the surface of the soil except in small quantity. The occasion is not opportune to suggest the end of a story, two chapters of which are not without some importance. The threads are in a correct position, the hooks are there to catch the threads, and threads are carried down. One cannot fail to recognise that so many accommodating conditions are not accidental. The fungus produces spores while attached to the style. From the shape and position of these spores it is probable that the hyphal threads are those of *Sporotrichum pulviniforme*. More detailed information respecting the presence of this fungus on the styles of the birch fruit at the time the fruit falls, awaits further investigation that is being carried on.

Much has been written respecting the relation between the higher plant and the fungus that forms the mycorrhiza.

Frank's opinion, as expressed in a paper already cited was, "that the organic union between root and mycelium, their harmonious growth and the close physiological relations which must exist, all point to this being a new case of symbiosis. From the side of the root we must regard the fungus as a parasite which takes from the former food-supplies of the nature of carbonaceous assimilated material; its minerals, etc., must be taken by the fungus itself from the soil, the free hyphæ acting as root hairs."

As regards the birch, it may be pointed out that during the first ten years of its life it grows at a rapid rate, lengthening as much as 2 to 2.5 feet during the first year. The association with the fungus would appear to put no check whatever upon the growth of this tree.

As already stated little was written respecting ectotropic mycorrhiza until recently. As a result of research opinions are still not agreed.

Weyland (1912), considers that the fungus in ectotropic mycorrhiza is really a parasite and has nothing to do with symbiosis.

Weevers (1916) is of opinion that mycotropic plants are, with the help of their fungus partner, able to utilise fully the organic compounds of the soil.

Rexhausen (1920) considers that the fungus and the root together form an osmotic unit for the absorption of nutrient salts.

At the conclusion of McDougall's account of his recent research he writes, "It was formerly believed that the ectotropic mycorrhizal fungi were of considerable benefit to the host plants, in that they aided them in absorbing materials from the soil, and this old idea is still retained in many, even of the latest, botanical text books. There is no evidence in favour of such a hypothesis, and it is the consensus of opinion of recent workers on these structures that the fungi are merely parasites on the roots of the higher plants and that the higher plants receive no benefit at all from the association." The effect of the above quotation loses much of its force when the writer adds immediately following it, "It is probable that as a rule no *great* harm to the higher plants results from this parasitism of its roots by mycorrhizal fungi." Surely this admission of the comparative harmlessness of the parasitism affords considerable ground for the hypothesis that the so-called host-plant gets some benefit from the fungus. It is to be regretted that in the paper from which the above quotation is taken, no citations from the writings of the recent workers on ectotropic mycorrhiza, with whose views the author agrees, are given. The literature cited, not including the writer's own publications, falls within the dates 1880-1906.

Bower⁷ (1919) is of opinion that "on the side of the fungus, which is already leading a saprophytic existence in the soil, a direct supply of carbohydrate will be obtained by contact with the root. The initial advantage from the coalition would then lie with the fungus. The advantage which the tree derives is, in the first place, the more ready supply of salts, and of combined nitrogen, extracted by the fungus from the soil."

From my own investigation of the birch tree I would recapitulate that :—

- (1) The shallow root-system of the tree bears ectotropic mycorrhiza for the greater part of the year, if there are no long periods of drought and if the winter is not severe. A really hard winter has not occurred in

7. Bower, F. O., *Botany of the Living Plant*, 1919.

England since these observations were commenced. Mycorrhiza were unusually abundant during the months of February and March 1923. Root-hairs of this root-system are entirely suppressed.

- (2) Seedling birches carry mycorrhiza during the first year of growth, yet they lengthen as much as two feet during that time. There are no apparent signs of injury to the seedling by the fungus.
- (3) Mycorrhiza become dry and shrivel within a short time, (30 minutes or less) on being exposed to a dry atmosphere. They readily part with the water that has been absorbed from the soil.
- (4) The structure of the mycorrhiza, when the radially-elongated cells are present, provides an effective channel for water passing from the fungus-mantle to the central axis of the root.
- (5) The thicker roots from which the filiform rootlets, that bear mycorrhiza, arise, have well-developed secondary wood, through which water passes readily to the stem. The wood of these thicker roots is often markedly excentric. This may mean little, but the fact is recorded for reference.
- (6) The means for carrying on physiological processes do not appear to be specially evolved for the benefit of the fungus. Different fungi produce different mycorrhiza upon the same tree at the same time. On the rootlets of the birch there are frequently found two distinct forms of fungus-root, one being brown and the other whitish-grey.

At the end of May, when birches are normally in full foliage, the leafless condition of the top branches of a large percentage of the trees was a conspicuous feature of birch woods in 1922. The appearance resembled a state that was common among birches during the years 1899-1901. Throughout that period birch trees in the Forest, and elsewhere in the South-eastern counties, were killed in great numbers by a microscopic fungus parasite, *Melanconis stilbostoma* (Fr.) Tul., which commences its fatal entry at the extremity of the top branches, follows a course between the cortex and the wood, and ultimately reaches the stem, down which it passes rapidly. The wood is killed and

discoloured wherever it comes within the influence of the hyphal threads.

The attack of last year, although wide-spread, was not so fatal as that of twenty-two years ago, but before anything more definite can be said respecting its virulence the course of the epidemic must be followed through another twelve months. The disease has not at any time been entirely absent from the Forest during the period 1899-1922, but on some occasions it has been difficult to locate it.

It is perhaps merely a coincidence that each of the epidemics occurred after a period of exceptional drought. As regards the phenomenal absence of rain during the year 1921, the occasion remains a vivid recollection with us all. The official figures relating to rainfall, on the Forest area, for the months March—October 1899-1900 show a considerable deficiency when compared with normal conditions.

The long drought on these two occasions makes it possible to infer that considerable damage was done to the superficial root-system of the birch by the prolonged absence of rain. On an examination of these roots in September 1922, it was abundantly evident that all the mycorrhiza, and a majority of the roots to which they were attached, had been killed. The soil, so late as the end of that month, was perfectly desiccated at the level where the mycorrhiza had functioned. The water supply with the contained salts had been cut off almost completely, consequently, the vital energy of the birch was lowered, and the inference is that its leaves and young twigs were thus rendered more liable to attack by fungi. The deeper rooted trees growing on the same ground did not suffer.

The roots of the wood-sage, *Teucrium Scorodonia* L., so closely associated with the birch, is covered with fungus hyphæ, one of which predominates. This fungus runs in somewhat parallel lines, with side branches, over the surface of the root, resembling incipient mycorrhiza, which it may be, not having passed the initial stage of development. Another member of the oak-birch wood association, the bluebell, has been stated to have endotropic mycorrhiza. It is probable that an investigation of the ground flora of the oak-birch association will add to the number of plants known to carry mycorrhiza.

It is plainly evident, from the quotations given above,

that opinions upon the relations between the fungus and the higher plant, in the case of ectotropic mycorrhiza, are conflicting. The questions at issue cannot finally be settled in the laboratory. More observations in the field must accompany the indoor work.

In conclusion, I wish to express my indebtedness to Mr. J. H. Pledge for the help he has rendered in making photomicrographs from my preparations to illustrate this Address.

EXPLANATION OF PLATES.

PLATE XI.

- FIG. 1.—Portion of the root system of a birch tree showing two forms of mycorrhiza; (a) white in colour; (b) brown; (c) rootlet bearing mycorrhiza. $\times 1$.
- FIG. 2.—Transverse section of brown mycorrhiza of birch; (a) mantle; (b) radially elongated cells of the root cortex; (c) inner cells of cortex; (d) endodermis; (e) central cylinder of xylem and phloem. $\times 20$.

PLATE XII.

- FIG. 1.—Inner portion of mantle, highly magnified; (a) Hyphæ between the walls of the cortical cells, two to four cells deep. $\times 410$.
- FIG. 2.—Portion of winged fruit of birch; (a) the styles, which remain until the fruit falls in autumn, forced apart as they would be on germination of the seed; (b) hyphæ around and between the styles; (c) portions of the membranous wings of the fruit. $\times 25$.

PLATE XIII.

- FIG. 1.—Germinating seed of birch, the seed-coat having been shed; (a) cotyledons; (b) hypocotyl with hooked processes on which hyphæ have been caught. $\times 25$.
- FIG. 2.—Two portions of hypocotyl from same seedling, that on the left showing (a) hyphal threads being carried down to the surface of the soil; that on the right showing (b) fully developed hooked processes (modified hairs) in profile. $\times 50$.

ON THE AMERICAN GREY SQUIRREL (*SCIURUS CAROLINENSIS*) IN THE BRITISH ISLES.

BY HUGH BOYD WATT, F.Z.S.

Read 27th January 1923.

"The quadrupeds of Britain are so few that every new species is a great acquisition."—GILBERT WHITE, *Nat. Hist. of Selborne*, Letter xxviii., 8 Dec., 1769.

THE decline and diminution in the mammalian fauna of the British Isles, both in species and in individuals, has for a long period been continuous and steady, and seems to be inevitable under the non-natural conditions of life which we have brought about. Under such conditions, the successful

introduction and establishment of a foreign mammal in a wild state is a noteworthy event, and this is what has happened in recent years, or is in the course of happening, with the American grey squirrel; the present paper is an attempt to give some account of this.

At the outset it may be remarked that although several of the mammals included in the British list are not native and came from foreign lands, namely, the rabbit, the fallow deer, and both the black and the brown rat, yet some two hundred years have passed since any species has succeeded in effecting a secure foothold and residence. The brown rat was the latest successful invader and it can be congratulated on certainly having made good, for itself, if not for us.

NATIVE HABITAT—NAME AND DESCRIPTION.

In its native region the North American grey squirrel, *Sciurus carolinensis*, Gmelin, has a wide distribution, ranging from about 46° N in Lower Canada and New Brunswick to Northern Florida and westward to the edge of the plains. Mr. R. I. Pocock¹ says that there are several local races, two of which (a northern and a southern) are dominant, and that it is the northern form that we have received as our guest in the British Isles.

This is distinguished by the name *Sciurus carolinensis leucotis*, but in the earlier period of its time with us it was called *S. cinereus*. The latest authority has placed it in a separate genus and named it *Neosciurus carolinensis* Gmelin², but nomenclature need not detain us here and we shall be satisfied with *S. carolinensis* as a working name.

In external appearance the species differs very markedly from the native British species, the common or red or light-tailed squirrel, *S. leucourus* (Kerr), formerly called *S. vulgaris* (the latter name now being confined to the species which inhabits the Continent of Europe and a large part of northern and central Asia). The grey squirrel is considerably larger than the red squirrel, about 11 inches in length as compared with 9 inches (in body), and in colour is uniformly greyish, grading from darker shades on the upper parts to whitish underneath. The

1. *The Field*, 25th January, 1922, p. 135.

2. Hinton, *History of British Mammals*, Part 21, Octr., 1921, p. 718.

ears have a conspicuous white patch behind, and the hairs of the long bushy tail are tipped with white. Where identification of the grey squirrel in this country is the result of observations out-of-doors only, there seems to be a possibility of confusion with the European species, *S. vulgaris* (from which I understand the grey squirrel fur of commerce comes), or perhaps even with the British squirrel in its greyish winter dress.

INTRODUCTION AND DISTRIBUTION IN THE BRITISH ISLES.

How came this attractive American stranger to find a footing and make a home in our midst?

There can be no doubt that it was by the voluntary action and agency of man, prompted probably by the desire to add a pleasing element to the wild life of our parks and woodlands. The picturesque and romantic story of squirrels navigating themselves across stretches of water on pieces of wood, with their big bushy tails spread out to a favouring breeze, is very pretty but does not fit in for the North Atlantic. In New York one of the attractions of the Central Park is the flourishing colony of grey squirrels and they are common in the city parks in many parts of the United States.³ This may have led to the experiment of trying them in similar surroundings in England.

The earliest date I know of their appearance is 1890, when the late Mr. G. S. Page, of New York, brought some grey squirrels to our country and turned out five of them in Bushy Park, Middlesex.⁴ The experiment was unsuccessful, although it is possible that some of the grey squirrels now occurring thereabouts, both on the Middlesex and Surrey sides of the Thames, may be descended from the first five. Of these localities more will be said later on.

The chief centre of introduction and dispersal in England has been Woburn, Bedfordshire, where, as is well-known, the Duke of Bedford has for a lengthy period maintained in the open a large and interesting collection of various species of foreign animals, many of them living in partial or almost entire freedom. The exact date of the introduction of the grey squirrel at Woburn is unknown, but it is some thirty years ago and may be contemporaneous with the Bushy Park episode mentioned above.

3. Mr. E. W. Nelson, *in lit.*, 24th March, 1917, to Mr. Oldfield Thomas, *The Field*, 28th April, 1917, p. 625.

4. *The Field*, 16th January, 1909, p. 117.

The animal found a congenial home at Woburn and has flourished exceedingly, and several other places (to be mentioned later on) have been stocked from this source.

The third centre in order of date is Finnart on Loch Long, Dumbartonshire, and reports are to the effect that a pair was liberated there about 1892, although it was not until 1903 that specimens first began to reach the hands of local taxidermists.⁵ The large numbers of squirrels and great extension of area in the district (of which further particulars are given on page 200 below) seem even more remarkable, if due to a single pair, than the developments at Woburn.

TOPOGRAPHICAL DETAILS.

I propose now to give some topographical details and shall begin with London and the home counties. In addition to personal observations these details are from reports made by other observers whose kindness and readiness in giving me information I gratefully acknowledge. Much of what follows is necessarily a compilation from these reports.

LONDON.

The first grey squirrels brought into the Metropolitan area were from Woburn, a number being sent to the Zoological Gardens in 1905.⁶ In a few weeks they became sufficiently tame and a number were liberated in the Gardens from whence they spread into the Regents' Park, where their familiar and confiding habits, combining friendliness with alertness, rapidly made them great favourites with visitors. This was the beginning of their popularity and many people became acquainted with this animal for the first time there. Now, after nearly eighteen years, they are estimated to number 250 in the Regent's Park and they continue to maintain their numbers although there is no obvious increase in recent years. They have spread outwards, and the gardens and open spaces of St. John's Wood, Parliament Hill Fields, Hampstead, Ken Wood, Highgate, Hendon and probably other North London Districts have become populated. In Hampstead they were first observed in the year 1908. Sometimes they turn townwards and Mr. Chas. Oldham tells me that he recently saw one at the entrance of

5. Mr. John Paterson, *Glasgow Naturalist*, 1912, iv., p. 136, and v., p. 40.

6. *Official Guide to the Gardens*, Zool. Society, 5th ed., 1907, p. 78.

Euston Station; and there was a flamboyant account in the *Morning Post* of 24th September, 1920, of the hunting of one in Earl's Court Road.

In the western district they made their appearance at a later date, being first observed in the central parks about fifteen years ago (say 1908), but they did not become noticeable till about 1914. The controlling authority, H.M. Office of Works, have kindly given me a report for the Royal Parks and I have included their information in these notes. (See also Appendix B.) From this it appears that at present the estimated number in the central parks is only about twenty, and the Department having extended their patronage and approval to the efforts to establish bird sanctuaries in the Royal Parks have determined to keep down the numbers of the squirrels. Here are their words from the published Report of their special Committee:—

“Another and serious danger to bird life arises from the presence of grey squirrels in large numbers in the Central Parks. The Committee realise that it would not be possible, on account of public opinion, entirely to exterminate the squirrels, but they are of opinion that the numbers should be kept down in Kensington Gardens and in Hyde Park, and that they should be exterminated, as far as possible, in Richmond Park.”⁷ Such a policy met with well-deserved and reasoned condemnation from Mr. Oldfield Thomas of the British Museum (Natural History) and others, but is being persisted in.

None of the other London Parks seems to harbour this squirrel although casual occurrences have been reported; for instance, Mr. W. S. de Lisle has seen it in Clissold Park.

HOME COUNTIES.

ESSEX.—Coming to the Home Counties the *genius loci* requires that Essex be mentioned first, even although it is the only one of the five in which the grey squirrel has not secured a footing. I have only one definite record, kindly given me by Miss G. Lister, from Mr. George Mitchell, whose work takes him frequently through the Epping district. He knows the grey squirrel well in its native North America and saw one in the upper part of Epping Forest near Gaynes Park during the summer of 1921, but has not seen it anywhere since. Miss Johnson tells me that some years ago grey squirrels frequented

7. *Bird Sanctuaries in Royal Parks*, p. 5, H.M. Stationery Office, 1922.

her garden at Loughton but they disappeared. In Epping Forest there are alien squirrels of another species, as reported in Mr. F. J. Stubbs' note appended. (See Appendix C.)

HERTFORDSHIRE.—In Ashbridge park (partly in Herts and partly in Bucks) the grey squirrel is well known; I saw one in the year 1916 and it is now plentiful. It occurs on Berkhamsted Common and elsewhere on the North side of the valley there but has not been seen yet on the south side.⁸ At Tring Park stray specimens had been reported previous to 1914 and there seems to have been no increase, as at present it is still rare and is seen only now and then, singly or in pairs. These are genuine wanderers, as it was never introduced at Tring.⁹ Another locality where a fine specimen was obtained in 1919 is Oxhey Wood, near Watford, and it is said to exist in Knebworth Woods, but this requires verification. In North Hertfordshire Mr. Ray Palmer writes that he has not seen more than three individuals, one of which was dead, and Mr. W. Percival Westell tells me that it is unknown in the Letchworth area.

MIDDLESEX.—Bushy Park, as already remarked, has the distinction of being the first place into which grey squirrels were introduced into England in the year 1890. Although unsuccessful then, they reappeared about twenty years ago and are increasing in numbers. At Hampton Court they have been known for about seven years but are only in small numbers, about fifteen. Further down the Thames at East Twickenham and St. Margaret's, specimens are believed to have been brought from the Regent's Park and liberated in gardens, from whence they wandered, one appearing in Major G. Hurlstone Hardy's garden at Twickenham in 1914. They are not increasing in numbers and Major Hardy does not believe that any colony has been established.

SURREY.—In Richmond Park grey squirrels were first seen about twenty-five years ago (1898) at the Kingston end, probably turned down by someone, and there they found a congenial home and flourished.

Since 1915, when a bird-sanctuary was formed, they have been systematically shot down by order, as they were overrunning the place. They continue to exist, and are estimated

⁸ *vide* Mr. Chas. Oldham.

⁹ *vide* Dr. E. Hartert.

at present to number from 150 to 200, in spite of the recent order for their extermination. At Kingston Hill they are reported as abundant, and as frequent at St. Anne's Hill, Chertsey, and as occurring in gardens at Wimbledon and at Putney. The Royal Botanic Gardens at Kew have become one of the strongholds of the species and Sir David Prain has kindly given me authoritative information about this. Two pairs were introduced from Woburn on 8th May, 1908, and speedily increased in numbers. One year they did great destruction to the tender young shoots of oak-trees and a ukase was issued on that occasion, and about 120 killed. The following year there seemed to be no diminution in their numbers, and they are still increasing and have found their way across the Kew Road and into the gardens of houses in Kew and that portion of Richmond next to Kew Gardens. Other Surrey localities from which I have records are Leatherhead and Caterham Valley, where the species was first seen some three years ago.¹⁰ I have a note of one seen swimming across the Thames near Eel Pie Island. Between 1910 and 1912 a pair was once seen in Alice Holt Wood, Rowledge,¹¹ but apparently did not secure a footing. It is not known in the Haslemere district¹² nor at Chiddingfold¹³ where the dominant tree is the oak, nor at Oxshott where the woodland is almost pure Scots Pine. I mention these and other negative records as they may be of some relative value in the course of time.

KENT.—In this county the greysquirrel is well-distributed and abundant in some places, particularly about Chislehurst, Knole Park, Rivershill, and Sevenoaks. At the last-named place Capt. C. W. R. Knight tells me they were liberated about twelve years ago by an enthusiast, and that they are increasing and spreading rapidly in spite of efforts to keep them down. On one estate last winter (1921) two hundred were killed and most of the keepers shoot them in these days. Capt. Knight offers to show me a single tree with four or five grey squirrels' dreys amongst its branches. Many albinos occur in this district and one captured recently was pure white with ruby eyes.¹⁴ At Maidstone the species is well established and the Museum

¹⁰ *vide* Mr. Richard Kearton.

¹¹ *vide* Mr. James Yates.

¹² *vide* Mr. E. W. Swanton.

¹³ *vide* V. N. Gauntlett & Co. Ltd.

¹⁴ Lieut.-Col. J. M. Rogers, *The Field*, 23rd December, 1922.

there has two specimens taken in 1920 and also two albinos, one a young animal from Moat Park in 1922. Holwood, Keston, has yielded a specimen as reported by Mr. C. C. Fagg. At Bessenden, near Cranbrook, some were introduced ten years ago and about four or five years ago they appeared at Stonewall Park, Edenbridge, where Mr. E. G. B. Meade-Waldo states that they were not introduced. He names other places in that locality where they occur (Hever, Chiddingstone, Penshurst, Cowden and Poidcombe), and says that they are perhaps increasing slowly in number. He makes the interesting observation that possibly five per cent of the squirrels are grey and that there are plenty of red squirrels in the district.

Passing from the Home Counties we come to :—

SUSSEX.—Mr. W. Ruskin Butterfield, of Hastings, reports that he is not aware of any recent introduction and he believes that the occurrences in the Hastings district are due to gradual extension of range. Grey squirrels have been seen at Battle, Crowhurst, Beauport, Sidlescombe, Westfield, Pevensey, Robertbridge, Bodiam, Brede, Rye and other places, and are decidedly on the increase. Mr. Butterfield has had three albinos from the Hastings District. At Horsham, West Sussex, four specimens appeared about eight years ago, probably escapes from Leonardslee where they were kept in a large cage, and Mr. J. G. Millais, who reports this, says that at present there are only a few, apparently not increasing in numbers.¹⁵

HAMPSHIRE.—For this county I have only two positive reports and many negative ones ; no grey squirrels are known in the New Forest or about Southampton¹⁶ and none in the Isle of Wight.¹⁷ The occurrences reported are, one at Yateley,¹⁸ and at Bournemouth, where the municipal authorities, with the object of adding to the attractions of the place, made an introduction about two years ago, and the numbers are said to have certainly increased.¹⁹ There is a report that they have been turned out near Newton Valence, but this requires verification.

DEVONSHIRE.—In South Devon it has been stated that the grey squirrel is fairly abundant, but my enquiries have

¹⁵ I saw one in Buckhurst Park, East Sussex, on 2nd April, 1923, and had seen a red squirrel a few minutes previously about a quarter of a mile away.—H. B. W.

¹⁶ *vide* Mr. W. Dale and others.

¹⁷ *vide* Mr. Frank Morley.

¹⁸ B. E. S. *The Field* 27th April, 1918, p. 566.

¹⁹ Dr. F. G. Penrose, Presidential Address, Bournemouth Natural Science Society, 22nd October, 1922.

had almost negative results. At Torquay one was seen in 1913,²⁰ probably only a casual as I have not been able to ascertain that there are any there now. At Exeter some agitation followed the introduction of two pairs into the Rougemont Gardens there on 15th June, 1915. They thrive exceedingly and became pests to the gardeners because of the destruction they did, and an edict of destruction was given effect to by the authorities. They had spread to some places near Exeter and an occasional one is still seen. At Durward about twenty were shot and they are said to be increasing in Stoke Wood. My informant adds: "nobody has a good word for the creatures."²¹

Enquiries made in other south-western and western counties, including SOMERSET, GLOUCESTER, WORCESTER and SHROPSHIRE ; and also in NORTH WALES, have brought forth only negative information.

BUCKINGHAMSHIRE contains a number of colonies of the grey squirrel, and there are authentic reports from many places including Burnham Beeches (which is a stronghold), Stoke Poges,²² Cliveden, Halton, Ivinghoe, the Aylesbury District, where it appeared previous to the year 1910 (said to have spread from Woburn, Beds), Shalstone Manor, Buckingham, Stowe, Wakefield and Whaddon Chase. It is not everywhere in the county, as there are none in the parishes of Hambledon, Turville and Fingest.²³ There are reports of its occurrence in the Chiltern beech-woods, but it can scarcely be in any numbers there, as in many visits I have never seen a specimen.

BERKSHIRE is almost blank, the only note I have being that a single grey squirrel was killed at Park Place, Wargrave, previous to 1919.²⁴

OXFORDSHIRE.—A grey squirrel was shot by Mr. G. Tickner about seven years ago in the Oxford District, and he believes that they have spread from Nuneham where some were apparently turned down a few years ago.²⁵ Mr. O. V. Aplin writes that in North Oxfordshire they spread from the east and north-east, about 1916, and that a local birdstuffer had quite fifty to stuff in 1922.

²⁰ *vide* Mr. T. A. Coward.

²¹ *vide* Mr. J. L. Sagar.

²² I am informed by Mr. M. C. Duchesne that about 200 were killed last year at Burnham Beeches and by Mr. H. Howard-Vyse, 30 at Stoke Place.

²³ *vide* Mr. Alfred H. Cocks.

²⁴ *vide* The late Mr. Heatley Noble.

²⁵ Mr. B. W. Tucker *in lit.* 5th February, 1923.

BEDFORDSHIRE.—The mother colony at Woburn has already been mentioned and from this centre the squirrels have dispersed themselves throughout the county and beyond its confines. Mr. J. Steel Elliott says that their present census in the county would run into thousands. At Woburn they are greatly reduced by trapping and are kept within reasonable bounds; as many as three hundred have been killed in one week and one thousand in a winter. I am told that the Duke of Bedford gave away squirrels in many parts of the British Isles for a time, but a record was not kept.

CAMBRIDGESHIRE.—The infrequent specimens found are said to be wanderers from Bedfordshire, but Mr. Wm. Farren, the taxidermist at Cambridge, has not known more than three in the county in about fifteen years.

NORFOLK.—Grey squirrels from Woburn were sent to this county some years ago (previous to 1914), but I have not succeeded in tracing them and the species is unknown in the county at present.

HUNTINGDONSHIRE.—Areas in this county are said to be over-run by the grey squirrel,²⁶ but I have no particulars.

NORTHAMPTONSHIRE.—Thanks to kind replies from Mr. H. N. Dixon and Mr. Fred Bostock to my enquiries the localities occupied in Northants can be named. Grey squirrels first appeared about ten years ago, the source not being known, and they are now found at Salcey Forest, Wakefield Lawn, Castle Ashby and Stoke Park, Stoke Bruerne, in all of which the numbers are increasing. There is also a record for Weston, near Towcester.²⁷ In the Oundle and Biggen districts Lord Lilford reports that the species is unknown.

WARWICKSHIRE.—I have a solitary but interesting note applying to the city of Birmingham :—"A gentleman who lived "near the top of the Hagley Road, Edgbaston, Birmingham, "kept a number of grey squirrels, about twenty, for many years "in his grounds [this was more than nine years ago], but there "came a day when these pretty little animals had to find other "homes, for their owner left to go to another town, and before "he went he let the squirrels loose, and in time they were seen "in the trees of various estates. Some gradually worked their "way to one or two gardens in the Wellington Road, where they

²⁶ N.B. *The Field*, 30th October, 1919.

²⁷ Mr. O. V. Aplin, *Zoologist*, August 1916, p. 312.

"could run about in the shrubberies or up the trees, one was seen running across the middle of the Wellington Road, just in the front of the motors, where it was soon seen at the top of a tall tree by all that passed."²⁸

LEICESTERSHIRE AND NOTTINGHAMSHIRE.—Enquiries have brought only negative replies.

CHESHIRE.—Mr. T. A. Coward gives an exceedingly interesting and specific account for this county, naming three centres of introduction, Lyme Park (about 1910 or 1911); Dunham Park (two pairs released at different dates about 1912, common by 1916); and Bramhall, near Stockport (previous to 1919). Records are also given for Alderly Edge (common by 1918, not introduced there and probably came from Lyme or Bramhall); Old Alderley, Chelford and High Legh. Also at Knutsford and Bowden, where one has visited Mr. Coward's garden and in 1922 there was a drey in a garden close to his house.

LANCASHIRE.—South Lancashire is mentioned by Mr. Coward, and "near Manchester" is one of the places to which specimens were sent from Woburn, but I have no particulars. One seen by Mr. Coward in 1916 at Withington was probably an escape.

YORKSHIRE.—In this large area there are two colonies fairly well established and stragglers in another district. At Scrampton Hall, Rillington, near York, Mr. W. H. St. Quintin received thirty or forty from Woburn in June, 1906. For a year or two they did not appear to breed much; then they began to increase rapidly, one nest being found with nine young in it. They became so destructive as to be a real nuisance and it was necessary to reduce their numbers. This was done by shooting and trapping and they were got down. A few are now tolerated, and when they become too numerous and complaints are made the culprits are soon removed. Mr. St. Quintin gave an account of this in *Country Life* for 17th October, 1914, p. 532, and has also very kindly given me later information.

In the West Riding, near Bingley, three or four pairs were liberated about ten years ago and stray individuals used to be seen, but they appear to have died out or disappeared. One

²⁸ Letter December, 1922, from Miss M. H. Steeple to Mr. Frank Morey, who kindly forwarded it to me.

was seen at Ilkley in the winter of 1922, but this was probably an escape.²⁹

Further north, at Bedale, some pairs were turned out in 1913 or 1914 and increased, and in 1919 were said to be becoming numerous and to do a good deal of damage in gardens.³⁰

LAKE DISTRICT AND FURNESS.—Dr. W. H. Pearsall reports that the species is not known.

SCOTLAND.

DUMBARTONSHIRE has already been mentioned as one of the first districts to be colonized. This is particularly interesting topographically as it takes the species across the Highland line and into a very different kind of country from its other British homes; by the sides of four great and lovely sheets of water—the Firth of Clyde, Loch Lomond, the Gareloch and Loch Long, and overshadowed by Highland Hills. The whole shire, except the industrial part near and east of the county town of Dumbarton, is occupied by the grey squirrel, and the details supplied by Mr. John Paterson, indicate that in about twenty-five years this squirrel has spread from a very small beginning in numbers (although I surmise that there must have been other introductions than that of the first pair at Finnart in 1892) to occupy territory of about twenty miles long by fifteen miles broad. The following are two incidents indicative of their numbers:—(1) At Camis Eshan, near Helensburgh, the keeper destroyed 150 and got the numbers pretty well under; (2) In a field by Loch Lomondside some stacks of corn were supposed to be holed by rats and thought to be useless for thrashing, but on turning them up not rats but twenty-six or twenty-seven grey squirrels were found in them.

STIRLINGSHIRE.—Just beyond the Dumbartonshire county boundary the grey squirrel has been known at Drymen since about 1915, undoubtedly an extension from the neighbouring county. Some years ago one was trapped at Touch, near Stirling.

AYRSHIRE.—There is a report of an occurrence at Brisbane, Largs, in 1919; and two other places in North Ayrshire, namely Montgreenan and Eglinton Castle, are inhabited by grey squirrels. They became very plentiful at Eglinton, but are said to have

²⁹ *vide* Mr. H. B. Booth, 30th December, 1922.

³⁰ See a Note by the writer in the *Naturalist*, June 1923, p. 221, and also G. C., *The Field*, 22nd November, 1919.

been got well under there. For most of the above Scottish information I am much indebted to Mr. John Paterson.

MID AND WEST LoTHIAN.—A solitary grey squirrel which made its appearance at Dalmeny was probably from a number that escaped about the year 1913 from an enclosure in the Park of the Scottish Zoological Society at Corstorphine, near Edinburgh. They did not remain long in the park and seem to have disappeared.³¹

FIFESHIRE.—At the Dunfermline Public Park, Pittencrieff Glen, grey squirrels were kept in cages for some years, but set free about 1919. They appear to have increased in numbers and spread, as odd individuals have been reported at Pitfirn and Rosyth, some miles away from Dunfermline.³²

IRELAND.

The only settlement in this part of the British Isles is in COUNTY LONGFORD. At Castle Forbes, the Earl of Granard, some twelve years ago, received about a dozen grey squirrels from Woburn, and since then they have increased so greatly as to have become a pest. About four years ago over three hundred were killed in the year, but the difficulty of having fire-arms in Ireland at present, revives the squirrels' chances. It has spread from Castle Forbes to places over ten miles away, passing in its journey some miles of bog without a single tree. Mr. Oldfield Thomas, F.R.S., has kindly placed this information, communicated to him by the Earl of Granard in 1922, at my disposal.

SUMMARY.

The preceding account shows that the grey squirrel occurs, in more or less numbers, in twenty-seven counties in the British Isles. These may be classified into three categories:—

1. Fifteen counties where there are one or more places in which the grey squirrel has established colonies and continues to maintain its footing or increase in number, viz.:—

London.	Hertfordshire.	Cheshire.
Middlesex.	Buckinghamshire.	Yorkshire.
Surrey.	Bedfordshire.	Dumbartonshire.
Kent.	Northamptonshire.	Ayrshire.
Sussex.	Huntingdonshire.	County Longford.

³¹ *vide* Mr. T. H. Gillespie, 18 January, 1923.

³² Dr. James Ritchie, *Scottish Naturalist*, 1923, p. 93.

2. Seven counties where the invaders have a precarious footing, viz. :—

Hampshire.	Warwickshire.	Stirlingshire.
South Devon.	Lancashire (South).	Fifeshire.
Oxfordshire.		

3. Five counties where there are only casual records, viz. :—

Essex.	Berkshire.	Mid Lothian.
Cambridgeshire.		West Lothian.

CONCLUSION.

This completes my narrative, and although the census I had amongst my objects is not complete it is clear that there must now be many thousands of grey squirrels settled in the British Isles, and, it may be asked, What of their future?

My conjecture is that they will maintain themselves, probably increase in numbers, and disperse in suitable areas, that is in woodland districts. Where there are no trees there are no squirrels, and this condition at once debars them from large stretches of the country. In this connection, it has to be noted that it is open parkland with trees, not large or close woodland areas, that seems to make the best home for the grey squirrel. It has not established itself in any of our large forests such as Epping, the New Forest, the Forest of Dean, the close beechwoods of the Chilterns or Delamere Forest, and not in the afforested parts of the Highlands. Wherever it becomes a nuisance or a pest it can readily be reduced in numbers and kept within bounds by shooting or trapping; to the last-named method it seems to fall an easy victim. Complete extermination is not likely by such methods, nor is it probably aimed at, and if extermination comes about it will more likely be by some epidemic similar to what often-times afflicts our native red squirrel. Squirrels have no powerful natural enemies in this country, although the jay, which plunders the red squirrel's nest of its young, would, no doubt, help itself to those of the grey squirrel if the opportunity came to it; and dogs and perhaps cats may take some toll of them, not to mention human enemies. In any case, I am of opinion that the grey squirrel can never become wide-spread and dominant like our other introduced animals, the rabbit and the brown rat, although some unfriendly critics compare it with the last-named, an entirely dissimilar species.

in habits and habitat, and "scare" articles in the newspaper press and popular magazines exaggerate the danger. If a comparison has to be made with another alien species it is much more reasonable to make it with the fallow-deer, a park and woodland animal, an attractive and valuable addition to our fauna, and the probability seems to be that the future may find these two species continuing to inhabit similar places in our country in limited numbers. I make no plea on utilitarian grounds but, like the rabbit, squirrels make excellent eating and it was entertaining to find that the author (Mr. L. C. R. Cameron) of one of the best of our war-time food-books, that on the *Wild Foods of Great Britain* (1917), had found this out and recommended the addition of the grey squirrel to our national diet. Mr. M. C. Duchesne's experience, however, is that the excellent flavour of the grey squirrel in its native home is lost in British killed animals, which are frequently infested with fleas and are offensive otherwise.

The other side of the picture is that the grey squirrel is exceedingly destructive and mischievous, although probably not more so than our native squirrel. A long list of enormities (to us) lies against them both, but these need not be recapitulated here.

In closing I should refer to another continually repeated charge against the grey squirrel, namely, that it is antagonistic to the native animal and displaces or destroys it. There seems to be something in this, but opinions differ much and conclusive evidence is entirely wanting. Thus, Sir David Prain says of the Kew Gardens introduction, "Their coming led somehow "or other to the disappearance of the red squirrels. But I "cannot say that we have much to complain of in the way of "mischievous done in other respects." The red squirrel has been a decaying and dwindling species throughout England for many years, and in reports recently received by me from many places all over the country, only one is named in which it is said to be maintaining its numbers at present. It has gone under or is disappearing in many places where a grey squirrel has never been seen or heard of. The hands of gamekeepers, foresters and others, who cannot spare a small share of the produce of their lands, are always against the squirrels. Where the red squirrel does flourish, as in the pine-woods and plantations of Northern Scotland, it is systematically killed off, and the Highland

Squirrel Club accounted for 46,000 animals in Inverness-shire and Ross-shire in the ten years preceding 1913. So that, taking everything into consideration, the future of the squirrel, whether the red or the grey kind, in this country is not too bright.

APPENDIX A.

BIBLIOGRAPHICAL NOTE.

1. 1915. WATT, HUGH BOYD.—“The American Grey Squirrel in Britain,” *The Field*, 12th June. Reprinted as a pamphlet.
2. 1917. THOMAS, OLDFIELD.—“The Grey Squirrel in England,” *The Field*, 26th April; giving a letter from Mr. E. W. Nelson, head of the Bureau of Biological Survey, Washington, D.C.
3. 1920. RITCHIE, JAMES.—*The Influence of Man on Animal Life in Scotland*, pp. 238-290; Remarks on the grey squirrel.
4. 1921. BARRETT-HAMILTON, G. E. H., and HINTON, MARTIN, A. C.—*A History of British Mammals*, pt. 21, pp. 718-720. Addendum to article on the red squirrel.
5. 1921. KNIGHT, C. W. R.—*Wild Life in the Tree-Tops*, pp. 49-50. Remarks on the decay of the red squirrel and increase of the grey one in Kent.
6. 1922. POCOCK, R. I.—“The Grey Squirrel in Great Britain,” *The Field*, 28th January, p. 135.

APPENDIX B.

ABSTRACT OF INFORMATION RECEIVED FROM H.M. OFFICE OF WORKS AS TO THE AMERICAN GREY SQUIRREL IN THE ROYAL PARKS IN LONDON AND THE NEIGHBOURHOOD, JANUARY, 1923.

Place.	First Observed.	How Introduced	Present Numbers.
CENTRAL PARKS :— Hyde Park and Kensington Gardens	About 15 years ago (1908)	Probably from the Regent's Park.	Slight increase. About 20.
REGENT'S PARK	About 18 years ago (1905).	From the Zoo- logical Gardens.	Increasing. About 250.
HAMPTON COURT	About 7 years ago (1916).	Probably from Hyde Park.	Increasing. About 15.
BUSHY	About 20 years ago (1903). [but see page 191 <i>ante</i>]		Increasing. Number not given.
RICHMOND	About 25 years ago (1898).	First seen at Kingston end, probably turned down by some- one.	Not Increasing. Probably 150 to 200.
GREENWICH	Never	—	—

INFORMATION FROM LIEUT.-COL. SIR DAVID PRAIN, F.R.S., LATE DIRECTOR
OF THE ROYAL BOTANIC GARDENS.

ROYAL BOTANIC GARDENS, KEW.	8th May, 1908.	Two pairs from Woburn.	Increasing ; now very plentiful.
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APPENDIX C.

REMARKS ON THE SQUIRRELS OF EPPING FOREST.

BY FREDK. J. STUBBS.

I lived five years (up to 1919) at Coppice Row, practically in the Forest at Theydon Bois. I never saw a Grey in any part of the Forest, nor did my wife, who knows the animal very well. In 1914 I noticed the scarcity of [red] squirrels near Theydon, especially towards Navestock and Ongar, where, five years before, I thought them normally common. The same scarcity had been observed by others: Mr. H. B. Debenham, of Thrifts Hall, Theydon Bois, well remembered Mr. C. E. Green of Epping (who died about 1916), purchasing squirrels from a man at Leadenhall Street Market and turning them loose on his estate at Epping. Writing now from memory it would be about 1916 when I began to notice jet black and red-tailed squirrels (that is, red squirrels with tails the same colour as the body), near Theydon. They were becoming troublesome to gardens, especially near the Golf Links, and I handled a good few specimens. At that period I had no leisure for much natural history work, but did compare the specimens with the descriptions in Gerrit Miller's book, and with Mr. Oldfield Thomas's article in the *Zoologist*. I did not submit specimens to any authority, but assumed they were *Sc. v. fuscoater*, probably from the Continent. After Mr. Debenham had told me about Green's experiment I wrote to Castang at Leadenhall Market, but got no reply; and when I left Theydon Bois I left the matter open, handing over the few specimens I possessed to the Essex Museum. But Mr. Hamlyn told me that about the time Mr. Green was buying squirrels, few if any British squirrels were coming into trade hands. He was receiving them from the Balkans, from Italy, and from Holland, perhaps also from Scandinavia. All these would, of course, be sold as *S. vulgaris*, not necessarily with intent to deceive purchasers.

Later on, towards 1919, squirrels grew more noticeable near Theydon, the majority being, from an inspection in the field, much like British squirrels. Very occasionally I saw one with the red tail at a season not agreeing with Mr. Oldfield Thomas's statements on the seasonal changes. Sometimes I saw black ones; my wife has reported squirrels just the colour of black cats. The grey squirrel had been reported Chingford way, but as I say we never saw it; indeed, I can safely say that it did not inhabit our end of the Forest between 1914-19. If casuals occurred they soon left again. I would like to repeat my idea (perhaps nothing more) that the red squirrel was decreasing in Essex after 1909; and the opinion of good observers like Mr. Debenham is that this was really the case.

Ringed Plover at Walthamstow.—One of these birds was heard calling at that part of the "Racecourse" which is contiguous to the sewage farm, on which it probably was. Inland records of this species are decidedly unusual for Essex. WILLIAM E. GLEGG, F.Z.S.

Meteorite at Ashdon.—On 9th March 1923, a meteoric stone, weighing 2½lbs., was actually seen to fall by a labourer at Ashdon, and has been acquired by the Mineral Department of the British Museum (Natural History).

ED.

RICHARD WARNER (1711-1775).

BY THE LATE PROFESSOR G. S. BOULGER, F.L.S., F.G.S.

[The following biographical sketch of the celebrated Woodford botanist, Richard Warner, author of the *Plantæ Woodfordienses*, was found in MS. among the late Professor G. S. Boulger's papers after his death. The deceased Professor had contemplated a new edition of the *Plantæ*, and intended the following account to be an introduction to that edition, to be edited by himself. From other available evidence it appears certain that the sketch was mainly written about the years 1883 to 1887, but with additions up till 1898.

The interest felt by Essex botanists in Richard Warner makes it desirable that Professor Boulger's careful researches into his life and ancestry should be preserved in our pages.

Since the sketch was written, Warner's residence, "Harts," has changed its character, and has become converted from a private residence into a sanatorium, being purchased by the County Borough of East Ham for the purpose in October 1919.—ED.]

SOME glimpses of the life and work of a well-educated country gentleman of the 18th century are likely to be of interest ; but when that gentleman is a friend or correspondent of Garrick, Bonnell Thornton, Hogarth, Linnaeus, Ellis, Philip Miller, Sir William Watson, and perhaps of Johnson himself, is a translator of Plautus, and the author of one of the earliest and best of local Floras, the interest cannot fail to be considerable. Such was Richard Warner, of Woodford Row, Essex, who was born in 1711 and died in 1775.

It so happens that a family of the name of Warner has been connected with the county of Essex since the time of Edward III., when it held the manor of Warners, in Great Waltham, and other land under Humphrey de Bohun, Earl of Hereford and Essex. The arms of this family, *or, a bend engrailed between six cinquefoils or roses, three and three, gules, with barbs vert and centres or*, are carved in several parts of the ceiling of the south aisle of the church of Great Waltham.¹ Its members intermarried with the families of de Maldon, Newdigate and others, and a branch of the family settled in Suffolk. An illuminated genealogy of this family, dated 1629, is in the possession of Sir Jervoise Clarke Jervoise, Bart., of Idsworth, Hants, the present representative of Richard Warner, to whom the writer is indebted for much kind assistance. To it has been added the name and

¹ Morant, *Hist. and Antiq. of Essex*, 1768, vol. ii., p. 84 ; Wright, *Hist. of Essex*, vol. i, p. 193.

arms of John Warner, sheriff and alderman of London, who seems to have had no connection with the Essex family, but to have probably been the great-grandfather of our author. The arms are, *or, a chevron sable between three boars' heads* ("trois *testes de sanglier*") *sable, with tongues gules*; and are the same as those on Richard Warner's book-plate. To John Warner's name is added, "His posterity dwelt at Highgate." He was Sheriff in 1640 and Lord Mayor in 1648, when he was knighted. A Francis Warner appears in the list of Sheriffs of London for 1660 who may have been a son of the above; but we have no further knowledge of the family until we come to Richard's father, another John Warner, who seems to have been born in or about 1663, since there are two portraits of him at Idsworth, one in crayon and one in oils, inscribed "*æt. 57, 1720.*" This John Warner was a goldsmith and banker, in business near Temple Bar, was a friend of Bishop Burnet, and is mentioned in Nichols' *Literary Anecdotes* (vol. iii., 1812, p. 74) as having always worn black leather garters. Nichols compares him in this respect with "the Upholsterer in the *Tatler*, No. 155, the "original of Murphy's Quidnunc"; and this comparison, by a commonly occurring series of blunders, is transformed, firstly (in the *Biographia Dramatica*, 1812, vol. i., p. 737), into the statement that John Warner himself "is somewhere mentioned by "Addison or Steele," and secondly (in *Lyson's Environs of London*, vol. iv., p. 283) into the more precise falsehood that he "is "mentioned in the *Spectator*."

John Warner seems to have had three sons, John (b. 1698), Robert and Richard. Burnet stood godfather to the eldest son, who seems to have predeceased his father. At Idsworth is a fine portrait of the Bishop, also a silver cup which he gave "with other plate" to his godson, and a Bible, the imprint of which is 1701 and in which is the following in Burnet's handwriting:—

"This Bible was given by me to John Warner
 " Junr, son to Mr. John Warner Goldsmith For whom
 " I stood Godfather at his Baptisme. In hope that
 " he will study and delight in those sacred writings and
 " by so doing make good the Vow that I took in his
 " name Imitating the vertues of his worthy Father
 " with whom I have had a long friendship: for whom

" I have a just and great esteem and to whom I owe
 " particular acknowledgments for many signall favours
 " received from him.

" At St. Johns

GI. SARUM."

" 20th Decr.

" 17ii.

John Warner, junr., seems to have been sent to Harrow, since a copy of Danet's *Dictionary of Antiquities*, 1700, at Idsworth, has scribbled in it, " E libris Johannis Warner ex dono
 " Revd. Viri Thomæ Brian Præceptor ejus in Rudimentis Linguae
 " Latinae. Sept. 10th 1711," " Sum e libris J. Warneri
 " scholæ Harroensis," and " E. libris Roberti Warner ex dono
 " Jo. Warner Junior. August y^e 14."

In his will, dated 1721, John Warner, senior, speaks of Robert as his eldest son, and on his book-plate Richard blazons the crescent as the " difference " for a second son. The father must have died either in 1721 or 1722, since in the latter year his widow purchased " Harts," the house at Woodford in which her son Richard passed the remainder of his life. Though merely styled Goldsmith by Burnet and not known to Mr. F. G. H. Price² as having kept running cashes, John Warner is called Banker on his son Richard's tomb at Woodford, and Nichols mentions³ an " old Mr. Thomas Snow, the first Banker of the
 " name in the Strand (who succeeded, I think, an old gentle-
 " man of the name of Warner in the House)." He purchased property in Clerkenwell, which he devised with all his real estate to his son Robert.

The history of this property is perhaps worth giving in detail. In 1696 Robert Harvey sold his estate in Clerkenwell, containing two ancient conduits, for £1,650 to John Henley and Walter Baynes. John Henley disposed of his moiety to John Warner, and Walter Baynes having turned one of the conduits into a cold bath, his moiety was purchased in 1736 by Robert Warner for £1,900. Robert Warner " leaving an only child
 " named Kitty, then married to Jervoise Clarke Jervoise, Esq.,
 " this gentleman, by the courtesy of England, became tenant
 " of the entirety of the premises on the birth of his eldest son,
 " Thomas Clarke Jervoise esq., who died in December 1809

² F. G. Hilton Price, *Handbook of London Bankers*, 1876.

³ *Literary Anecdotes*, ix., p. 642.

" at his seat, West Bromwich Hall, Staffordshire. By his will, " dated the 15th of January 1808, he devised " all the estate upon trust to his executors to be sold for the benefit of the children of the Rev. Samuel Clarke, who afterwards took the name of Jervoise ; and at the sale in 1811 the estate, which comprised Cold-Bath House, Cold-Bath Square, Little Warner Street, Great and Little Bath Streets, Ray and Dorrington Streets, the Phoenix Foundry, Red Lion Yard, a distillery and ten public-houses, realised nearly £77,000.⁴

Robert Warner was, like his younger brother, a member of the University of Oxford.⁵ A printed slip, found in a book at Idsworth, is inscribed, " Mr. Robert Warner, near Temple Bar, London. Printed at the Theatre in Oxford, Sept. 15, " An. Dom. 1718." He may have married into the Leigh family, since his son was named John Leigh Warner, and there are portraits at Idsworth of Barnabas Eveleigh Leigh (born 1703) and his wife, painted in 1736 by Joseph Highmore, an artist who painted many portraits in his day of students and residents in or near Lincoln's Inn. John Leigh Warner died in boyhood in 1765, and his father, whose will bears date May 8th, 1764, probably about the same time, leaving his daughter Katherine heiress to considerable property. Part at least of the Clerkenwell property seems, however, from Richard Warner's will, to have passed into his possession.

From his books, now preserved at Idsworth, Robert Warner seems to have been a man of considerable education and classical study and to have maintained the friendship with the Burnet family. Some of his books also are presents from his younger brother. He possessed an estate at Belmont, near Bedhampton, in South Hants, which probably brought his family into connection with the Clarke Jervoises of Idsworth. Mary Elizabeth, daughter of Thomas Jervoise, of Herriard, married Samuel Clarke, of West Bromwich, Staffordshire, son of Sir Samuel Clarke, High Sheriff of London in 1713, and had one son, Jervoise Clarke, and a daughter Anne. Jervoise Clarke, who afterwards took the surname of Jervoise by act of parliament in compliance with the will of his mother's father, and sat in Parliament for Hampshire, married in 1763 the heiress who is

⁴ Pink's *History of Clerkenwell*, p. 124.

⁵ He matriculated 13 February, 1721-2, at Wadham, aged 16. Barrister-at-law, Lincoln's Inn, 1729.

commonly known as Kitty Warner, and she had three sons, Thomas Jervoise, Robert and Samuel, before her own death, which occurred before 1775, her husband surviving her. To him and his children thus passed the entire Warner property, including "Harts," since Richard Warner was never married. At Idsworth there are portraits of John Leigh and Kitty Warner and two others, probably Robert and Richard Warner, the names of which have unfortunately been lost.

Of "Harts," for more than fifty years the home of Richard Warner, the fullest account is the following letter in the number of the *Gentleman's Magazine* for July, 1789 (vol. lix., part ii., pp. 583-4.), accompanied by a plate.

"Mr. Urban,

June 6.

"The seat of Jervoise Clerk Jervoise, esq., at Woodford, Essex, delineated in Plate 1, is situated at a considerable distance from the road, about eight miles and three quarters from London, behind several rows of beautiful elms, which form an evening walk for the gentry of the village. It is called HEARTS, and was built in the year 1617, by Sir Humphry Handforth, master of the robes to king James I. That monarch was much attached to this house, and used to breakfast here frequently when he took the diversion of hunting in Epping Forest. By marriage it became the property of the Onslow family. Arthur Onslow, esq., so famous in the House of Commons as speaker, and for several parliaments, was born here; his brother, the General, and several children likewise. When the Onslows removed to an estate near Guildford in Surrey, this was sold to Mr. Sherman, a linen-draper in Cheapside. After his decease his daughter sold it, in 1722, to Mrs. Warner, widow of Mr. John Warner, a banker near Temple Bar, who left it to her younger son, Richard Warner, esq., in 1743, and he left it to his only niece, married, in 1763, to Jervoise Clerk Jervoise, esq., member for the county of Hants, in whose possession it now remains. The house is furnished with a choice collection of paintings by eminent masters, and a good library of books, with many choice articles worthy to be seen by the lovers of antiquity. The gardens are laid out with rural and elegant taste. There is a large and intricate maze, and a thatched house in the middle, with lines Latin and English, emblematic of the situation, which, I am sorry to observe, are falling to decay. There is likewise an artificial ruin of an abbey, which does honour to the designer; the walls, which are entwined with ivy, are decorated with Gothic windows and painted glass; the broken arches, and romantic disposition of the ruins, are so artfully contrived as to make the observer imagine it is in reality what it artificially means. In short, the house is so curious, and the gardens, etc., so delightful, as to have been honoured, at different periods, with the presence of royalty. Yours, &c.,

"A Lover of Antiquity."

In this account there are two slight errors: first, Arthur Onslow, the Speaker, was not born at "Harts," though his father,

Foot Onslow, did reside here, but, according to Lysons,⁶ at Little Chelsey: and, secondly, Kitty Clarke dying before her uncle, he left his property to her husband and children.

Such was the home to which Richard Warner came as a boy of eleven,—a fine old country house, with large gardens and paddocks, lying between Snakes' Lane, Woodford Green, Muncombe and the present station of the Great Eastern Railway at Woodford.

The next point we know of in the life of our author is his admission as a member of Wadham College, Oxford. This occurred, as the writer is informed by the Warden (to whom he is indebted for kind assistance readily given), between Midsummer and Christmas 1730,⁷ Warner entering as a Commoner. He took his B.A. degree in 1734, but does not appear to have proceeded to the M.A., though he retained a love for classical studies and a kindly feeling towards his Alma Mater. "He was," says Nichols,⁸ "bred to the law, and for some time had chambers "in Lincoln's-Inn; but, being possessed of an ample fortune, "resided chiefly at a good old house at Woodford Green in "Essex, where he maintained a botanical garden, and was "very successful in the cultivation of rare exotics"; or, as the anonymous annotator of a copy of the *Plantæ Woodfordienses*, belonging to Mr. Fisher Unwin expresses it, he was "educated "for the law, but a good fortune enabled him to give up that "odious profession."

In his youth, Nichols informs us, he was remarkably fond of dancing—a fact which, as Pulteney points out,⁹ is also "related of the great Linnæus," "nor till his rage for that diversion "subsided, and," Lysons adds, "not without some reluctance, "when he became more advanced in age, did he convert the "largest room in his house into a library."

In 1743 his mother died, and in the garden at "Harts" there still exists a stone inscribed by him to her memory. A Bible at Idsworth printed in 1716 is inscribed, "Richard Warner "1743, from his Mother," "Richard to his niece Katherine "Warner, 1754," and contains a long letter on reading the Bible from Robert Warner to his daughter, dated "Belmont, 1st Feb.

⁶ *Environs of London*, vol. iii., p. 214, and vol. iv., p. 283.

⁷ He matriculated 18 July 1730, aged 17, at Wadham.

⁸ *Literary Anecdotes*, vol. iii., p. 75.

⁹ *Historical and biographical sketches of the progress of Botany*, 1790, vol. ii., p. 283.

1756." There are also two prayer-books, given by the uncle to the niece in 1757 and 1762 respectively.

At "Harts" in 1748 Richard Warner received a somewhat distinguished visitor, Peter Kalm, a pupil of Linnæus, Professor of Economy in the University of Abo, in Swedish Finland. This naturalist was born in Finland in 1715, and having imbibed a taste for natural history, devoted himself at first to the study of the flora of Sweden, to which he discovered many additions. Originally intended for the ecclesiastical profession, he was drawn to the pursuit of natural history by the lectures of Linnæus at Upsala; and, having paid particular attention to the uses of plants, was selected by Linnæus to undertake a journey of exploration, in 1747, to North America. He set out in October of that year, sailing from Gottenburg; but, compelled by stress of weather to put back to the Norwegian coast, did not reach the Thames till February. He stayed in England till August, making excursions in various parts of the country, and was introduced to Warner by Dr. (afterwards Sir) William Watson, F.R.S. After more than two years' collecting in America Kalm returned to London in March 1751, leaving for Gottenburg in May. His *Travels (En Resa til Norra America)* were published in three volumes octavo, at Stockholm, between 1753 and 1761, in Swedish, much of the first and second volumes referring to England. A German translation of the first volume (*Reise nach dem Nordlichen Amerika*) by Carl Ernst Klein was published at Leipzig in 1754, and one of the whole work (*Des Herrn Peter Kalms . . . Beschreibung der Reise . . . nach dem Nordlichen Amerika*) by Philip and John Murray, at Gottingen, between 1754 and 1764. An English version of the latter (*Travels into North America . . .*) by John Reinhold Forster, appeared in three volumes at Warington in 1770-71 (second. ed., London, 1772), from the long preface to which Sir J. E. Smith obtained most of the information for the article "Kalm" in Rees' *Cyclopædia*; but unfortunately all the description of his stay in England has been omitted!

His description of a visit to Woodford never having appeared in English, may be given here.

"February 28th. In the morning I went by land to a place "named Woodford, ten English miles from London, in Essex. "The road along which we travelled was level with only occa-

sional small hills. The whole journey consisted of nothing but an alternation of beautiful houses, fruitful fields, green pastures and such-like. There was generally a separate garden to every house, filled with all kinds of fine trees. Even the walls were covered with the slender leafless wood of shrubs. In some places instead of palings the gardens were divided by live hedges of yew, elm, hawthorn or other trees. All the land was divided into inclosures surrounded by hedge-rows of hawthorn, sloe, bramble and holly. In some places, especially near London, there were, instead of hedges, mounds of earth two yards high round the fields. They were made of the reddish-yellow clay prevalent hereabouts, mixed with sand, gravel and pebbles. . . . The charming aspect of the land must be mainly ascribed to the labour expended upon it. It is like one continuous pleasure-garden from the many evergreen hedgerows which everywhere occur, as far as the eye can reach. The innumerable towers of London could only be but dimly seen in the distance, although the air was clear, since a sort of cloud hung over the city from the coal-smoke which proceeded continuously from the closely-grouped chimneys. The roads are so full of passengers on foot and on horseback, with waggons and carts going and coming, that it seems as if one must cut one's way through them. At some points the Thames was visible covered with many sailing-vessels and ships from afar. Canals, constructed with much industry and skill, flow in various directions. . . . To the north and east of Woodford is a charming forest. The soil here is, as in the main throughout the district, a coarse, reddish, or rather reddish-yellow, sand, here called 'gravel,' mixed with finer soil and a large proportion of ordinary black flints. The forest itself is on rather high ground. There are said to be many rabbits and deer; but I did not see any as I passed through, nor could I find any plants as yet (March 7th) in flower. The trees, however, and the ground itself, were already all green. The trees were not, however, allowed to grow to their proper height, but were cut down to nine or twelve feet from the ground for firewood. This cutting had caused numerous branches to shoot out on all sides so that the stem ended in a round crown."

Kalm stayed with Warner from February 28th to March

16th, and again from the 20th to the 23rd, when he rode to Little Gaddesden in Hertfordshire to stay with Mr. William Ellis, the agriculturist, returning on April 16th, and coming back to town with Warner on the 21st. They then spent some days lionising, visiting Westminster Abbey, the Monument, St. Paul's, where Kalm describes a Festival of the Sons of the Clergy, Ranelagh, Vauxhall, Greenwich, Peter Collinson's garden at Peckham, and, above all, the Chelsea Garden, "one "of the most renowned in Europe, where we found the learned "Mr. Miller as *Præfectus Horti*," and the wonderful library and collections of Sir Hans Sloane, then in his eighty-eighth year and confined to his bed.¹⁰ Kalm seems to have become intimate with Philip Miller, of whom he gives a full account : he enumerates many of Sloane's chief curiosities and made the acquaintance of many of the leading Fellows of the Royal Society. Always keeping his eyes open, he describes the Portland stone used by Wren and the Hertfordshire Pudding stone, the raising of the Arbutus from seed by James Gordon, the herbaria of Ray and Dale, mutilated by Sherard, at Chelsea, May-Day festivities, the Chelsea nursery gardens, the prorogation of Parliament by George II. in person, the London penny-post, a Quakers' meeting, and many other things. Returning to Woodford with Warner for two days more on May 7th, on the following day he visited with him "das prächtige Schloss des Mylords Tilney" at Wanstead.

He tells us that Warner kept four Newfoundland gulls in his garden, which came to be fed when called, and also that he was informed by him that the furze "flowers all the year through, "even in the severest months of mid-winter." He also enumerates the chief trees of Epping Forest, as well as those commonly cultivated in gardens, and one cannot but be impressed with the conviction that Warner's Swedish guest made good use of his powers of observation during his five months' stay in England.

It is perhaps noteworthy in connection with Kalm's visit to Warner that, among other relics of its former proprietor, the garden at "Harts," which the writer has been able to visit through the kindness of Mr. James Spicer, who now resides there, contains fine specimens of the beautiful North American shrub, *Kalmia*, that immortalises the Swedish traveller. Kalm's

¹⁰ Sloane died January 1753, aged nearly 93.

discoveries materially enriched the herbarium and the "*Species Plantarum*" of Linnæus, and, having obtained the order of Wasa and published more than eighty opuscula, in Swedish or Latin, mainly relating to the agriculture, commerce, manufactures and natural products of Sweden, he died in 1779. The fullest account of his life is that given in Hoefer's *Nouvelle Biographie Générale*.

In 1748 the garden at "Harts" gave a new and beautiful plant to the lovers of flowers, that known as the Cape Jasmine (*Gardenia florida*).

Some coloured but faded sketches by Anne Clarke, now at Idsworth, show the garden as it was in Warner's time, and, though the maze and inscriptions are gone, the ruins of the "abbey," the memorial stone to his mother, a fine old Weeping Willow, and other trees and shrubs dating from his time, still exist. The row of elms was enclosed by the Rev. Sir Samuel Clarke Jervoise, but little of it now remains; whilst the existing house was built by—Mellish.

Having, in the many-sidedness of his culture, an educated taste for our Elizabethan literature, and especially for that relating to the drama, Warner, we are informed by Nichols (p. 75), had, in 1768, "been long making collections for a new edition of Shakespeare; but on Mr. Steevens' advertisement"¹¹ "of his design to engage in the same task on a different plan, "he desisted from the pursuit of his own." In that year (1768) he published "A Letter to David Garrick, esq., concerning a "Glossary to the Plays of Shakspeare on a more extensive "Plan than has hitherto appeared. To which is annexed a "Specimen. By Richard Warner, esq." This letter occupies 92 pages octavo, besides the title page and seventeen pages of the Glossary. It was "printed for the Author: and sold by "T. Davies in Covent Garden." It is dated "Woodford-Row, "Essex, Janry 1st 1768," and commences—

"Sir,

"The many favours received during the course of a long, uninterrupted and happy acquaintance. . . ."

Although turning aside to other studies, Warner was, Nichols tells us, employed "to the last hour of his life" upon this Glos-

¹¹ George Steevens published twenty of Shakespeare's plays in 4 vols., 8vo, in 1766, at the same time announcing his proposed complete edition, which appeared in 1773.

sary, all the papers relating to which he bequeathed to his "friend" David Garrick, esquire, of Adelphi Buildings," directing, by his Will, that they were to be published and the profits, if any, applied to a fund for decayed actors. In a codicil, however, he left the papers absolutely at Garrick's disposal and gave £40 to the decayed actors' fund.

A translation of Plautus next engaged our author's attention when a verse translation, two volumes of which appeared in 1766, was announced by Bonnell Thornton. In the Preface Thornton writes :—

"In consequence of my having advertised this design, I had a still further incitement to proceed in it; as a gentleman [Note: Richard Warner, of Woodford Row, Essex, esquire. This gentleman had translated several of our author's plays into prose, and had begun one in verse, the *Captives*, which is inserted in the first volume of this work] to whom I was then a stranger, was pleased to decline all thoughts which he had before conceived, of prosecuting the same intention. To him I am indebted for his assistance in one play, as well as for communicating to me whatever he thought might be of service in the undertaking, with that heartiness which endears him to all who have the happiness of being acquainted with him. The same gentleman also took upon himself the trouble of translating the life of our author from Petrus Crinitus."

On Thornton's death, in May 1768, Warner added to this Preface an address, "To the Reader," signed "Richard Warner, Woodford Row, Essex, July 15th, 1769," in which he says, "This second edition, in regard to the memory of my deceased friend, I have undertaken to revise and correct," and, speaking of long-continued indisposition which kept him in the country, announces a continuation uniform with the original, which forms volumes 3, 4 and 5 of the work and is entitled "*Comedies of Plautus translated into Familiar Blank Verse*, By the Gentleman who translated the *Captives*." Volumes 3 and 4 were issued in 1772 and volume 5 in 1774. Volume 3 contains a preface, dated August 1st, 1772, by Warner and the following dedication :—"To David Garrick Esquire, this translation with notes and illustrations of the remaining Comedies of Plautus being a continuation of a work successfully begun

“ by the late Bonnell Thornton esquire is inscribed as an instance
 “ of his sense of the uninterrupted friendship with which he
 “ has long favoured him as well as in particular of his kind
 “ advice in the prosecution of it by his much obliged humble
 “ servant Richard Warner.” The fourteen plays translated
 by Warner are the Captives, the Twin Brothers, the Discovery,
 the Apparition, the Cheat, Conjugal Fidelity, the Casket, the
 Parasite, the Churl, the Carthaginian, the Courtezans, the
 Persian, the Ass-Dealer and the Lots. There is at Idsworth
 a copy of the complete work presented by Warner to Anne Clarke,
 sister of Jervoise Clarke Jervoise. She lived at Belmont and
 bequeathed all her private property to her favourite nephew,
 the Rev. Sir Samuel Clarke Jervoise, the father of the present
 baronet.

It was before the issue of his continuation of Thornton's
Plautus that our Author printed the work with which we are
 mainly concerned, the *Plantæ Woodfordienses*, the preface
 to which bears date July 1st, 1771.

It is worthy of note that the book was never published,
 but only “ Printed for the Author ” ; and from its scarcity we
 may infer that the impression was but a small one.

On the 11th of April, 1775, this kindly and industrious
 scholar and gentleman died, and on the 20th he was buried in
 Woodford churchyard under an altar-tomb, covered with a grey-
 marble slab, on the north side of the chancel. The inscription
 on the tomb was :—

“ Here lieth interred
 the body of
 Richard Warner, Esquire,
 of Woodford Row,
 in this county,
 son of John Warner, Esquire,
 of the City of London,
 banker,
 who departed this life

April the XIth, MDCCLXXV, aged LXIV years.”

Nevertheless, the Woodford register contains the entry
 “ Richard Warner, aged 62, buried April 20, 1775.”

(To be continued).

SCATTERED BIRD NOTES FROM THE WALTHAMSTOW RESERVOIRS.

By JOHNSON S. JEFFREE.

STARLING (*Sturnus vulgaris*). After the young have left the nest, the birds use the trees on the reservoir-islands as roosting-spots and assemble in multitudes.

CARRION-CROW (*Corvus corone*). This inveterate nest-robber has been seen to destroy even the eggs of a swan, during the temporary absence from the nest of the adult bird ; Mallard's eggs are similarly destroyed and the contents devoured by the greedy Crows. I wage incessant war on these robbers ; during April and May 1922 I destroyed 19 of their nests, with 67 eggs and four nestlings.

HERON (*Ardea cinerea*). During the war, in or about the year 1916, an anti-aircraft gun at Wanstead scared several of the birds from the heronry there, and these settled on the reservoir-islands and built nests ; the new colony has increased in numbers each year since, and in 1922 I counted 54 old birds and 11 nests.

SHOVELER (*Spatula clypeata*). On April 8, 1922, three pairs of these ducks settled on the reservoirs for a short rest, but left the same evening.

TUFTED DUCK (*Fuligula cristata*). Nests here in small numbers. Numerous and large flocks visit us in winter.

COOT (*Fulica atra*). Thousands of Coots visit us in winter, but only a few remain to breed.

GREAT CRESTED GREBE (*Podiceps cristatus*). The first appearance of this handsome bird on these reservoirs was some twelve years ago, since which they have increased in numbers, at least fifty being now present. In May 1922, I counted 11 nests : one nest was left high and dry by the lowering of the water-level in the reservoir, but remained intact, and the young were successfully hatched out.

LITTLE GREBE (*Podiceps fluviatilis*). Nests in the reeds. Among my more interesting records of bird-visitors to these Reservoirs are the following :—

Wheatear
Waxwing
Crossbill

Smew
Water-Rail (very rare).
Dotterel



THE FLOWER BORDER AT WARLEY LEA.

Cormorant	Golden Plover
Shag	Lapwing
Grey Goose	Oyster-catcher
Pink-footed Goose	Common Sandpiper
Sheld-Duck	Redshank
Pintail	Greenshank
Teal	Curlew
Wigeon	Common Tern
Pochard	Little Tern
Goldeneye	Great Black-backed Gull
Goosander	Great Northern Diver

MRS. BERKELEY, OF SPETCHLEY.

ESSEX still possesses many distinguished scientists and much else of which she may be proud, but she has sadly fallen from her former high position of being one of the leading Counties for accomplished and learned gardeners and plant lovers, amateur as well as professional. So many of her gardens were famed far and near that to enumerate them would fill pages.

In the present dearth we cannot afford to cede to Worcestershire the whole credit to such a distinguished amateur gardener as was Mrs. Berkeley of Spetchley, but must accentuate the fact that half of her all too short life was spent at Warley where she learnt garden craft from her mother, Mrs. Willmott, who was herself skilful in the art and the third generation of enthusiastic amateurs.

Mrs. Willmott was one of the pioneers who broke away from the Mid-Victorian tradition of carpet bedding and ribbon borders and she sought to make her garden beautiful with the former denizens of English gardens.

A few of Evelyn's plants still survived at Warley and they were carefully tended. Other old favourites were enthusiastically collected from all over the country. They were not so easy to come by as they are now and had to be hunted out of old gardens such as Mrs. Willmott's old home, Fitz-walters, where the gardens remained as they had been for generations.

Very few nurserymen then specialized in herbaceous plants, but a certain number of old plants occasionally found their way to Prothero and Morris' Sale Rooms. Mrs. Berkeley was as keen to recover the old plants that were to be found as was her mother, and she begged to be allowed to attend the sales with her governess. There are still at the Cheapside Sale Rooms some of the old hands who remember her sitting at the table keenly awaiting her chance to buy any unusual herbaceous plants which might be offered.

Growing up in such favourable surroundings and under the influence of such a keen gardener as Mrs. Willmott, it was small wonder that the eager little plant-lover should have developed into an accomplished gardener and a good botanist.

As a child her greatest joy was to slip away after lessons to the garden, where no gardening jobs came amiss, from catching slugs and caterpillars to collecting seeds.

The herbaceous borders at Warley Place, as they are now, are largely due to her efforts. She had always a keen sense of proportion, and a rare taste in effective grouping. The lessons learnt at Warley stood her in good stead when she came to make the thousand yards of herbaceous borders at Spetchley into the finest in the whole country. But she had previously had her own Essex garden, for the first years of her married life were spent at Warley Lea. The land lent itself to skilful treatment, and the flower garden she made there soon became remarkable for its beauty and charm. It was here she commenced to cross-fertilise primroses, a work which was to give the garden primrose a new and wonderful development. Its aim was a right combination of colour, size and form, with robust constitution. In many instances development in hardy plants has led to monstrosity, deformity or coarseness, but Mrs. Berkeley never lost sight of the prime importance of refinement, and her work of 25 years upon the primrose has produced results that entirely satisfy the most fastidious taste, for the perfection attained is of the foremost yet reached in any race of hardy plants.

Although Essex rightly claims the beginning of this excellent work we must yield to Worcestershire its full achievement, as well as the fame of the wonderful gardens she made at Spetchley, where the beautiful setting, fine trees, and ideal climate, all lent themselves to her magic touch. No description could do justice

to its charm, only those could realize it who had had the privilege of being shown the gardens by Mrs. Berkeley, with their untold treasures of rare plants, growing and thriving as nowhere else and as naturally as in their native homes. There, walking round with her, looking from the garden across the lakes to Breden, and to the sun setting behind the Malvern Hills, was a pleasure the impression of which could never be effaced.

A fit memento to one whose life was spent for others and whose greatest pleasure was her garden, are the beautiful lines of Jamman Shud now on the alcove overlooking the Fountain garden scene :—

“The Moon of Heaven is rising once again :
How oft hereafter rising shall she look
Through this same garden after me—in vain.”

ELLEN WILLMOTT.

THE VANGE MINERAL WELLS.

By WILLIAM WHITAKER, B.A., F.R.S., F.G.S.

THE “Vange Mineral Wells” are nearly a mile W.S.W. from Vange Church, and about $1\frac{3}{4}$ mile N.N.W. of Fobbing Church. The site formed part of the Vange Hall Estate, so naturally they got named after Vange, though really in the parish of Fobbing. They are close to the parish boundary, on the eastern side of Martinhole Wood, which is in Vange.

The site of the various wells that have been made here is in a tract of London Clay, a formation which reaches its greatest thickness in Central Essex.

The Geological Survey Map 1, S.E., on which this part of Essex is represented, was published in December, 1868, and therefore must have been surveyed in 1866 or earlier ; so that we are dealing with a map, part of which is probably almost 60 years old, and therefore open to corrections and additions. It will be seen from this map, that on the dominant ridge of London Clay, which stretches eastward from Laindon Hill towards Pitsea, four very small outliers of Bagshot Sand have been mapped, Langdon Hill itself being a larger and prominent one,

with two other small patches near by, on the north and south. All these are duly noticed in the *Geological Survey Memoir*, "The Geology of London." etc., vol. i., p. 279 (1889).

It is clear, therefore, that on the higher parts of these hills we must have the uppermost and usually more sandy part of the London Clay, which of late years has been separated by geologists under the name of Claygate Beds, from a village in Surrey where they are well developed. It may seem strange to take a name compounded of clay for a set of beds divided from a great clay-formation on account of their more sandy character, but I fear that geologists have never been noted for their adherence to truth in matters of nomenclature.

It seems likely, then, that it may be owing to the presence of the somewhat sandy Claygate Beds that water has found its way downward from the surface, through the top part of the hill-range, until it has reached the more clayey beds beneath. When the Geological Survey extends its new work into S.E. Essex we shall have direct evidence on this question ; meanwhile we may have to be content with surmise.

By one of those curious coincidences which happen pretty often, whilst the Essex Field Club was examining water that may originate in the Claygate Beds (on May 12, 1923) the Geologists' Association was disporting itself at Claygate.

Where the great quantity of the various salts in the water come from, or how they may have been evolved in these beds, is a question difficult to answer, and I leave it alone. Sulphate of lime, of course, occurs in all clays.

It is notable that the fields around the wells are of small agricultural value ; they are now in pasture, with a good deal of scrub in the form of briar-bushes ; perhaps, therefore, roses might be grown here. Can it be that the alkaline contents of the loam and sandy clay are antagonistic to vegetation ?

There are other mineral waters in the neighbourhood, and we may note one over two miles to the north-east, of the water of which we have an analysis. This is at Luncies, in the parish of Vange, about $\frac{3}{4}$ of a mile north-westward of Pitsea Church.

I went there with Dr. Bullough, who kindly got for me the analysis of the water, and we saw two wells, said to be about 20 and about 80 feet deep, the latter in the yard just west of the house, from which the sample analysed was taken.

This analysis, made by E. J. Parry, on October 12, 1922, is as follows :— (presumably in parts per 100,000).

Calcium carbonate	50
Calcium sulphate	148
Magnesium sulphate	224
Sodium sulphate	258
Sodium chloride	48
Iron	Trace
Silica, alumina, etc.	30

758 (given as 780)

The chief difference between this water and that from Mr. Cash's wells seems to be in the absence of sulphate of potash in the former ; the total sulphates are also less.

The new well sunk on Mr. Cash's land and inspected by the members of the Club, gives a more highly sulphated water than the original well, as shown in the following analysis by Dr. Thresh :—

Calcium carbonate.. ..	23.5 parts per 100,000
Calcium sulphate	121.0
Magnesium sulphate	538.5
Potassium sulphate	53.5
Sodium sulphate	194.7
Sodium chloride	97.0
Water of hydration	80.2
Silica, etc.	5.6
<hr/>	
Total solids	1114.0

Red-Throated Diver at Bocking.—On February 16th, 1923, I had brought to me a living adult male Red-Throated Diver, which had just been captured in a field at Bocking. It was uninjured, but with its breast and wing feathers smothered with crude oil, and was apparently unable to fly further owing to this. We are quite seventeen miles from the coast.

ALFRED HILLS.

A living specimen of the Common Dab (*Pleuronectes limanda*), seven inches in length, captured at Leigh, Essex, was observed to excrete a mass of some forty or fifty dark-coloured plant-seeds, which were identified as Linseed (*Linum usitatissimum*), surely an unusual food for a marine fish.

F. J. LAMBERT.

THE VANGE MINERAL WATER.

By JOHN C. THRESH, M.D., D.Sc., Etc.

THE mineral water which has recently sprung into notoriety escaped the attention of the writers when preparing the Geological Survey Memoir on the water supply of Essex. Some 20 years ago, Mr. E. Cash, having purchased the Vange Hall Estate, which is all on the London Clay, noticed that at one spot the ground was always moist. He collected a little of the water, and finding that it had a saline flavour he submitted it to Dr. Rideal for analysis. So much sulphate of magnesium, sodium and potassium was found in it that Dr. Rideal pronounced it a medicinal water, and Mr. Cash's experiments upon himself and friends led him to think these properties were very valuable indeed; in 1922, some almost miraculous cures being reported, certain gentlemen connected with the London Press began to enquire into it, and in consequence of their investigations the publicity given to the water caused an extraordinary demand. The writer went over and obtained a sample of the water and Mr. Cash, junior, courteously shewed him the well from which the water is raised to the pump-room. It is in a shallow valley running nearly north and south down the side of the hill to the north of the main road near Vange Church.

The subsoil here is a heavy loam and yields a little water. Samples have been collected from the wells around, varying it is said from 14 to 60 feet in depth, and all yield sulphated waters. Some, however, have been abandoned, and surface-water gains access. Consequently they are more or less polluted and the true loam-water diluted. Mr. Cash, however, is constructing his wells so as to prevent the influx of surface-water, and there is no other possible source of pollution near the site. The loam or clay here is rich in crystals of selenite, and in fissures in the clay and in the masses of septaria layers of crystals of calcium sulphate abound. In the neighbourhood of the wells the clay, thrown out in excavating, dries and becomes covered with a white efflorescence, which dissolves in water and consists chiefly of calcium and magnesium sulphates.

Sulphated waters are common in Essex throughout the whole London Clay area. They all contain calcium and magnesium sulphates, but comparatively few contain also the cor-

responding sodium and potassium salts. They are found both near the surface and throughout the clay to its base. The deep wells or bores are nearly all abandoned, but some are still to be found about Mundon, Althorne, Stow Maries, and Bulphan. At the last named place the water contains also a considerable amount of common salt.

Two wells may be sunk in the same parish, yet the waters be markedly different. A single example will suffice. In the parish of Althorne are two wells about a mile apart. In both the water is derived from the basement-bed of the London Clay which formation here is about 300 feet thick. These waters were both sulphated, but differed considerably, as the following analyses show :—

		Parts per 100,000.	
		No. 1 well	No. 2 well.
Calcium carbonate	..	23.0	29.3
Calcium sulphate	..	92.0	7.6
Magnesium sulphate	..	120.6	42.5
Sodium sulphate	..	0.0	59.2
Sodium chloride	..	90.1	49.3
Silica, &c.	..	2.3	2.1
Total solids		328.0	190.0

Within a mile the same stratum yields a water which contains no trace of calcium or magnesium sulphates and comparatively small quantities of sodium sulphate.

A bored well near Wick House, on Bulphan Fen, gave the following results—in parts per 100,000.

Calcium carbonate	..	..	29.3
Calcium sulphate	..	..	114.9
Magnesium sulphate	..	..	362.5
Magnesium chloride	..	..	45.5
Sodium chloride	..	..	231.0
Water of hydration, etc.	..	..	34.8
Total solids		..	818.0

These deep well-waters have never been used medicinally, but in past times shallow well-waters, rich in sulphates, have acquired a reputation, notably at South Weald, Upminster, and Hockley. The following analyses of these waters are taken

from "The Mineral Waters and Medicinal Springs of Essex,"
by Miller Christy and May Thresh.

Parts per 100,000.					
	South Weald.		Upminster.		Hockley.
Calcium carbonate	..	17.0	..	30.8	.. 39.7
Calcium sulphate	..	59.2	..	89.8	.. 95.9
Magnesium sulphate	..	104.7	..	129.4	.. 197.3
Sodium sulphate	..	38.0	..	13.9	.. 0.0
Sodium chloride	..	10.9	..	15.2	.. 95.0
Silica, water of hydra- tion, &c.	..	19.2	..	19.9	.. 2.5
Total solids	249.0	..	299.0	.. 430.4*

The Hockley water maintained its reputation for some time, but it cannot be compared with the Vange water since it contains no alkaline sulphates and much less magnesium sulphate. The true Vange water from Mr. Cash's well is undoubtedly a strongly sulphated water, and it is much more concentrated than the other Essex waters now being sold as Vange water. The analysis of the water contained in a sealed bottle purchased by me at the well, and of a bottle purchased from a local chemist's, show the difference between them.

Parts per 100,000.			
	Mr. Cash's well.	"Vange" water from Hockley.	
Calcium carbonate	.. 46.5	.....	46.0
Calcium sulphate	.. 88.7	.....	57.4
Magnesium sulphate	.. 495.0	.....	144.0
Potassium sulphate	.. 38.4	.....	0.0
Sodium sulphate	.. 144.8	.....	0.0
Sodium chloride	.. 60.3	.....	61.0
Water of hydration, silica, &c.	.. 86.3	.....	36.6
Total solids	960.0	.....	345.0

The second sample is apparently Hockley water. It contains no sulphates of the alkalis and less than one-third of the magnesium sulphate contained in the real Vange water. It is obvious that as a sulphated water the Vange water is far superior to the other.

* Water of hydration removed by drying at + 200° C.

The various wells now being sunk yield water of the same type, varying slightly in strength, but none of them contain as much sulphate of magnesium as in 1901 when first examined by Dr. Rideal. At that time, however, the water contained less of the alkaline sulphates. By a judicious proportioning of the supply from the different wells on Mr. Cash's land it should be possible to maintain a supply of fairly constant quality.¹

These sulphated waters have received a good deal of attention from the medical profession and apparently whilst the magnesium sulphate acts chiefly on the intestines, encouraging peristaltic action, the sulphates of sodium and potassium slightly stimulate the secretion of bile. Thus, by aiding in the expulsion of effete matter from the system the risk of auto-intoxication from the bowels is decreased. There may, therefore, be a real foundation for many of the cases alleged to be cured by this water, but the action of "faith" cannot be ignored.

¹ It should also be mentioned that the water from Mr. Cash's wells is of considerable organic and bacterial purity, whilst the sulphated waters of some of the other wells in the neighbourhood are very impure.

The Dale Family.—[The following note, which should be read in conjunction with Mr. Miller Christy's account of the family of Samuel Dale, of Braintree (in *ESSEX NATURALIST*, xix., p. 49, *et seq.*), is of interest as giving some additional items of information on the subject.—ED.]

Samuel Dale, of Braintree (third son of North Dale, of Whitechapel, silk-throwster, by his wife, Christian Clark, and grandson of John Dale (d. 1625), and Elizabeth Dale) was baptised 15th Aug. 1659, at St. Olave's, Hart Street, the parish where his grandfather resided.

As to his first wife, Judah, I can give no particulars, but the will of his second wife, Sarah Finch, dated 1 July 1726, was proved 13 March 1729, in the Deanery of Bocking in P.C.C. There is no other Dale will proved in that Court.

The only child, a daughter, Christian, was living 5 Aug. 1738, at the date of Samuel's will, which was proved 6th April 1739, in the Commissary Court for Essex in P.C.C.

Of his two nephews, John Dale was for 44 years Minister of the Dissenting Meeting in Faversham, and Francis Dale, the apothecary of Hoxton (d. 1762), became the father of Thomas Dale, the physician of South Carolina, Member of the Upper House there, who by his 4th wife, became the father of Thomas Clement Simons Dale, of Devonshire Street, who was great-grandfather of Admiral Alfred Taylor Dale.

If, as I believe, this family was nearly related to Valentine Dale, D.D., Ambassador to France for the marriage of Queen Elizabeth, his arms were *Argent, on a bend sable 3 wolves passant of the field. Crest. A naked arm embowed holding a sword bendways proper.* HYLTON B. DALE, Enfield.

THE ESSEX FIELD CLUB—REPORTS OF MEETINGS.

ORDINARY MEETING (553RD MEETING).

SATURDAY, 28TH OCTOBER, 1922.

The first meeting of the Winter Session was held on the above afternoon in the Physical Lecture Theatre of the Municipal College, Romford Road, Stratford, the President, Mr. Robert Paulson, F.L.S., F.R.M.S., in the chair. Forty-four members attended.

The following persons were elected members of the Club:—

Miss Clara Everitt, of 7, Earlham Grove, Forest Gate, E.7.

Mrs. E. J. Foster, of "Upshire," 1, Clivedon Road, Highams Park, E.4.

Mrs. Annie Richardson Hatley, B.Sc., of 6, Lyndhurst Road, Highams Park, E.4.

Mr. Henry Soper, of 113, Romford Road, Stratford, E.15.

The Hon. Secretary announced that the Council had that afternoon appointed Miss Vera Oxley as honorary assistant curator of the Club's collections in the Forest Museum at Queen Elizabeth's Lodge.

Mr. Avery exhibited a series of 27 pen-and-ink and wash drawings by Major Bamford, illustrating churches, etc., in the Southend district and elsewhere.

A small collection of Earth Stars was exhibited and presented to the Club's Museum by Miss G. Lister; it comprises the following species:—

Astræus hygrometricus (Pers.) Morgan. The genus *Astræus* is distinguished from *Geaster* by having the contents of the inner peridium traversed by veins of sterile tissue, instead of having the sterile tissue either absent or concentrated to form a columella. In the present species the outer peridium splits on maturity into star-like lobes, which spread out or back when moist, and curl closely over the inner peridium when dry.

In woods; uncommon in Britain. The specimen exhibited was from France, where it is sometimes very abundant.

Myriostoma coliforme (Dickson) Corda. The outer peridium splits into reflexed star-like lobes; the inner peridium is attached to the outer by several short stalks and opens by eight or more distinct mouths.

On sandy soil; rare in Britain. The exhibited specimen was from Florida.

Geaster umbilicus Fries. In this minute species the outer peridium splits into many lobes, reflexed when dry; the inner peridium is sessile, and opens by a closely furrowed prominent mouth.

On sandy ground, not common. The specimen was from Jersey.

G. finbriatus Fries. The outer peridium at length convex and split half-way into many reflexed lobes; the inner peridium sessile or shortly stalked, opening by a few irregular teeth.

In woods and open pastures. Specimen was from Lyme Regis. By far the commonest of our earth stars.

G. lageniformis Vittadeni. Unexpanded plants ovate; the outer peridium splitting half-way into reflexed tapering lobes; the inner sessile on the saucer-like base of the outer peridium, opening by a conical mouth clothed with silky fibres.

In beech woods. The specimen was from Cambridge from Prof. H. Marshall Ward.

G. fornicatus Fries. The outer peridium splits into two layers, an outer cup-shaped layer which remains in the ground, and an inner leathery layer, which divides into four or five long reflexed lobes, attached by their tips to the outer layer; inner peridium small, dark brown, opening by a conical mouth.

In pastures, heaths and under firs. The specimen exhibited was from a garden at Hitchin.

Miss Edith Prince exhibited and presented to the Museum a specimen of *Geaster Bryantii* Berk., found by her last September, on sandy soil, between Chingford and High Beach. Some specimens found on the occasion were already expanded, others were entire, and might almost have been mistaken for small pebbles at a casual glance. This species differs from the preceding by the inner peridium being stalked, and the stalk surrounded above and below by a prominent collar; the inner peridium, which is mottled grey and buff, opens by a conical deeply-furrowed mouth. This appears to be the first record of an Earth Star from the Epping Forest district.

Mr. Nicholson also exhibited and presented a *Geaster* from Norfolk.

In connection with these exhibits, Mr. Hugh Main mentioned that in September last he had seen hundreds of Earth Stars in the South of France, in the dried-up portion of a river-bed.

Miss Lister also exhibited two large mycetozoans, *Lindbladia effusa* from Oxshott, and *Brefeldia maxima* which had appeared spontaneously in her own garden at Leytonstone.

Mr. Hugh Main exhibited various living insects from the South of France, including the Praying Mantis (*Mantis religiosa*), the spiders *Lycosa narbonnensis*, with young clustered on the parent's back, and *Clotha durandi*, the small black scorpion (*Scorpio europaeus*), a larger yellow scorpion (*Buthus occitanus*) and a small lizard; and also the Giant Shore Earwig (*Labidura riparia*) from the shore at Bournemouth.

The Curator exhibited six specimen-drawers from the large Cabinet of British Lepidoptera, bequeathed to the Stratford Museum by the late Mr. William Cole, also an oil-painting by Mr. H. A. Cole, representing his brothers and others "sugaring" for night-flying moths in Lords Bushes, Epping Forest, about 1885; and a home-made "sugaring"-lantern made by Mr. H. A. Cole, both of which latter had been given by Mr. Cole to the Museum.

Mr. Mera read a report which he had prepared on the Cole Collection of Lepidoptera (printed *ante*, p. 172).

The thanks of the meeting were given to Mr. Mera for his report, and to the several exhibitors and donors.

Mr. T. A. Dymes, F.L.S., then read a paper "On Collecting and Curating Fruits and Seeds for the Study of Local Dispersal," illustrating same by the exhibition of an extensive collection of preserved fruits and seeds. At the conclusion of the paper, the President referred appreciatively to Mr. Dymes's collection which, to his knowledge, had been very many years in the making, and commented on the carefully thought-out manner in which it was arranged to economise space. Miss Lister, Mr. Whitaker and the Hon. Secretary also spoke with appreciation of Mr. Dymes's method, and a hearty vote of thanks was accorded to the author.

In expressing thanks for his cordial reception, Mr. Dymes called atten-

tion to some specimens and drawings of the Bog Orchis (*Malaxis paludosa*) which he was exhibiting, showing the green bulbil formed at the base of the flowering axis, which remains through the winter to germinate in the following spring.

The meeting then terminated.

CRYPTOGAMIC FORAY—LOUGHTON TO HIGHBEACH.— (554TH MEETING).

SATURDAY, 11TH NOVEMBER, 1922.

Some 36 members and friends joined this Foray, which took place in mild, favourable weather, following a day of heavy rain.

The referees were as under:—

<i>For Mosses and Hepatics</i> ..	..	{ Mr. L. B. HALL, F.L.S., and Mr. W. R. SHERRIN, A.L.S.
<i>For Lichens</i> .. ..	..	{ Miss A. LORRAIN SMITH, F.L.S., and Mr. R. PAULSON, F.L.S.
<i>For Fungi and Myxomycetes</i> ..	..	Miss G. LISTER, F.L.S.

The party assembled at Loughton Station at 10.41 o'clock, and made its way through the village towards Strawberry Hill. Before entering the woodlands a halt was called just before eleven o'clock, and the two minutes' Silence of Remembrance of the Great War was duly observed, it being "Armistice Day."

Entering the Forest at "Staples Pond" (a pond no longer, the brick dam having been broken away some two years ago, and the pond converted into a swampy glade with a meandering stream—the "Loughton Brook"—winding through it), the route followed by the party was by way of Grubb's Pits to Blackweir Hill, and so to the old Gravel Pit near Monk Wood, where lunch was taken. The gravel pit was found to be converted into a rushy pool by choking up of the ditch which has hitherto drained it, and the site of the *Osmunda* and other ferns noticed a year ago was now drowned beneath two feet of water.

Proceeding through Great Monk Wood to the Wake Valley, and collecting *en route*, the party, by this time split up into several groups, gradually made its way in the direction of the headquarters at the Roserville Retreat, Highbeach, where, at 4.30 o'clock, tea was served.

After tea a meeting of the Club was held with the President (Mr. R. Paulson, F.L.S., F.R.M.S.) in the chair.

Miss Catherine M. Hughes, of 116, *Cranbrook Road, Ilford*, was elected a member of the Club, and one certificate of nomination was read.

The President then called upon the several conductors for reports on the day's finds.

Miss Lister reported that 14 species of myxomycetes had been found, among them a fine development of *Lamproderma violaceum*, which occurred in shining black, freshly-formed sporangia on the under side of a mass of much-decayed beech-wood. This species, which is far from common

in Epping Forest, was found by Miss Evitt. The following is a list of the species found :—

Badhamia utricularis.

Physarum nutans, and the var. *leucophaeum*.

Leocarpus fragilis.

Comatricha nigra.

Lamproderma violaceum.

Dictydiaethalium plumbeum.

Trichia varia.

T. scabra.

T. decipiens.

T. Botrytis.

Hemitrichia Vesparium. Uncommon in Epping Forest.

Arcyria denudata.

A. cinerea.

Perichaena corticalis.

Some 60 species of Fungi were noted during the ramble, the more interesting forms being *Cantharellus infundibuliformis*, *Coprinus lagopus*, *Mutinus caninus* (some of the undeveloped peridia being distinguishable when only 2.5 mm. in diameter), *Tremella tubercularia*, *T. foliacea*, and *Helvella lacunosa*.

Mr. Hall reported 39 species of mosses as having been noted during the Foray. He remarked that of the total number of mosses (110) recorded from Epping Forest, 35% were spring-fruiters, 39% summer-fruiters, only .08% were autumn-fruiters, and 26% fruited in winter; the 110 species included some 26 species which very rarely fruited, and these comprised some of the commonest mosses, such as *Leucobryum glaucum*, *Tetraxis pellucida*, the species of *Campylopus*, etc., found in the drier spots, which reproduced themselves by vegetative means.

Mr. Sherrin mentioned that at last year's foray *Webera proliqera* had been found, and this identification had since been confirmed. He also referred to the difficulty of separating *Dicranum bonjeani* and *D. scoparium*, var. *paludosum*, except by microscopical examination.

Miss Lorrain Smith discussed the rate of growth of lichens, and recorded that of a species of *Parmelia*, which attained 35 mm. \times 22 mm. in eight years, not a large amount.

The President, after recording the finding of *Verrucaria aquatilis* growing on pebbles in a running brook in the Forest at Loughton (a new record for the County), took up Miss Smith's challenge, and gave instances of rapid development of lichens, which he had found growing on such substrata as the bones of dead sheep and rabbit-droppings on the ground.

Mr. Thompson added his testimony on the subject in support of the President's view. He instanced a specimen of *Parmelia perlata*, measuring 4 inches (i.e., 101 mm.) in its larger diameter, which he had found growing, with other well-developed lichens, on the freely-flaking bark of young plane-trees at Sandown, Isle of Wight, and which he had placed in the Club's collection.

Cordial thanks were passed to the conductors, and the meeting broke up, the visitors groping their way along the dark Forest roads to Loughton and Chingford Stations.

ORDINARY MEETING (555TH MEETING).

SATURDAY, 25TH NOVEMBER, 1922.

The second Winter Meeting was held as usual in the Physical Lecture Theatre of the Municipal College, Romford Road, Stratford, with the President, Mr. R. Paulson, F.L.S., F.R.M.S., in the chair. Thirty-five members were present.

Dr. Arthur Smith Woodward, F.R.S., Presdt. L.S., etc., of 4, *Scarsdale Villas, Kensington, W.8*, was elected an Ordinary Member of the Club.

Mr. P. Horn exhibited and presented to the Museum a coloured model in plaster, of a huge Common Toad (*Bufo vulgaris*), from a specimen brought from Southern France by Mr. Hugh Main; and explained his method of modelling.

Mr. Hugh Main exhibited and presented a living Gecko which had been found in a crate of bananas opened at Woodford; he also exhibited, on behalf of Miss Evitt, some large foreign ants which had been found running over some bananas.

The Curator exhibited and described two specimens of *Badhamia utricularis* which had been very successfully grown by Miss Greaves in the Club's Museum during several weeks, and which exhibited several stages in the life-cycle of this mycetozoan. Miss Lister added some details on the life-history of the species.

Mr. Thompson also exhibited a set of 168 coloured drawings of British wild and garden plants, which had been presented to the museum by Capt. Crawford, R.N.

Mr. Avery exhibited and described a series of old prints, including some of "Belhus," Aveley; as this property has recently been sold to a syndicate, and may probably be demolished in the near future, the exhibit was very seasonable.

The Curator directed attention to the special exhibit, in the Museum, of photographs of the Saffron Walden district taken by our members, Messrs. Daymond and Nunn, during the Club's visit there last Easter, and presented by them to the Club.

The thanks of the Meeting were passed to the various donors and exhibitors.

Mr. Whitaker made his report as Club's Delegate to the Conference of Delegates of Corresponding Societies at the British Association Meeting at Hull in September last, and was cordially thanked for same.

Miss G. Lister read a paper "On a New Species of *Didymium* occurring in Essex," and exhibited and presented to the Museum the type-specimen of this new mycetozoan, which she proposed to call *Didymium trachysporum*.

Mr. Percy Thompson read a paper entitled "Bird Pellets and their Evidence as to the Food of Birds" (printed *ante.*, p. 115), and exhibited the Club's Museum collection of pellets in illustration thereof.

Miss Hibbert-Ware read her "Notes on the Gizzard Contents of Birds collected by Mr. Miller Christy," now in the Club's Museum, and illustrated her remarks by a series of lantern photographs (see *ante.*, pp. 142).

In the course of the discussion which followed the reading of the last two papers, Miss G. Lister mentioned that she possessed an owl's pellet from a wood near Hitchin, which contained the skeleton of a Noctule Bat; and exhibited it.

Mr. Glegg, in proposing a vote of thanks to the authors, referred to a Bee-eater which had been seen to eject from the mouth the remains of a beetle. Mr. Horn, in seconding, remarked that apparently no fish-scales or bones had been noticed in the Herons' pellets, probably owing to their rapid solution by the bird's digestive juices.

The authors replied to several points raised during the discussion, and the thanks of the Meeting were duly accorded to them. The President, in putting the motion, narrated how a Robin had come into his house, had gaped, and then vomited—evidently a pellet; but, unfortunately, the "mess" had been carefully cleared up before he was informed of the occurrence.

The meeting then adjourned.

VISIT TO THE BRITISH MUSEUM (NATURAL HISTORY).— (556TH MEETING).

SATURDAY, 13TH JANUARY, 1923.

This visit was arranged, at the kind invitation of Dr. W. T. Calman, F.R.S., for the purpose of studying, under his guidance, the exhibited series of Cetacea in the Whale Gallery.

The party (a very small one, owing to the prevalence of thick fog throughout the morning) was received by Dr. Calman at 2 o'clock in the Large Central Hall, and was at once conducted to the Whale Gallery.

Dr. Calman remarked that whales are classified in two groups—those with whalebone only in the mouth and no teeth (the Whalebone Whales), and those possessing true teeth (the Toothed Whales).

Whales were descended from land-mammals which, probably in Eocene times, had taken to an aquatic life, and they had in consequence undergone extensive modifications; the general fishlike outline, and the development of a dorsal fin which served to keep the animal on an even keel, were examples of the general rule that like conditions of environment bring about similarity of structure. Whales had lost their ancestral coating of hair, which was no longer serviceable to them, they being kept warm by the thick layer of fat (blubber) underneath the skin; the Rorqual yet preserves vestiges of hairs on its chin. The hind limbs of the whales are reduced to vestiges, a rudimentary hip-girdle, with the legbones represented only by cartilage, being present in the common Rorqual, though other whales have actual legbones beneath the skin. The removal of the nostrils to the top of the head (the "blow-hole") is another modification due to their mode of life as aquatic animals.

Dr. Calman gave an interesting sketch of the history of the whale-fisheries. He said that the Basques were the first whalers of whom we had cognisance, they hunted the whale known as the Biscay Whale, or the North Atlantic Right-Whale (*Balæna biscayensis*) from small boats in the Bay of Biscay. This fishery persisted from the 10th to the 15th century, until the whales were killed off from these waters. Nowadays the Biscay Whale has to be sought far away in the North Atlantic. In the 16th century the Dutch took up the trade, fishing off Spitsbergen and employing Basque harpooners; the English soon followed suit; it therefore happens that certain technical terms employed to-day in whale-fishing (among others the words "harpoon" and "cachalot") are of Basque origin. At the present day the

whale fishery is declining, owing to the Right Whales being vastly reduced in numbers. Dr. Calman remarked that when he was a lad in Dundee the value of the whalebone from a single Right Whale might amount to £1,000. To-day the Rorquals were hunted as far afield as South Georgia in the Antarctic, although the whalebone obtained from them is shorter and less elastic, therefore of less value than that of the Right Whales. During the recent War the blubber from these Rorquals was used as a constituent of margarine and also in the manufacture of explosives. One Rorqual had been measured in South Georgian waters and was proved to be 105 feet in extreme length—probably the largest mammal ever known in the earth's history. The foetal Rorqual has rudiments of teeth which, however, never cut the gums.

In recent times, one of the Toothed Whales, the Narwhal, was hunted for its single horn, although this is valueless for ivory on account of its "shakes." Yet good prices were obtained for it, and it was found that a certain Indian Rajah was purchasing the horns in quantity as a valued charm against the "evil eye."

Dr. Calman then conducted the party to the museum workshop, where casts of various whales were actually being made. One of these, a new accession, a freshwater Dolphin (*Lipotes vexillifer*), ♀ from the river Yangtse-Kiang, 1,000 miles from the sea, attracted much interest; like other freshwater Dolphins it is blind, and it exhibits in a marked degree the structural asymmetry which all the Toothed Whales possess more or less.

At the conclusion of Dr. Calman's most interesting talk, the President moved the cordial thanks of the party to him for his kindness; these were warmly accorded, and the party separated.

ORDINARY MEETING (557TH MEETING).

SATURDAY, 27TH JANUARY, 1923.

This Meeting was held in the Physical Lecture Theatre of the Municipal College, Romford Road, Stratford, the President, Mr. Robert Paulson, F.L.S., F.R.M.S., in the chair. Fifty members attended.

The Hon. Secretary announced the death, on the preceding Wednesday, of Mr. Thomas Vincent Holmes, F.G.S., a past president of the Club. Mr. Whitaker stated that he had attended the funeral of his old friend that morning at Shooter's Hill; and both Mr. Whitaker and the Hon. Secretary spoke of the deceased gentleman's work for, and gifts to, the Club. On the President's motion, a vote of condolence with the surviving relatives was passed in silence, the members standing.

Miss Constance E. Prichard, of 7, *The Broadway, Woodford Green*, was elected a member.

The Hon. Secretary announced the appointment by the Council of a Committee to draw up a revised list of the plants of the Epping Forest district, and both he and the President invited the co-operation of botanical members in compiling this list.

The Curator exhibited:—

- a. An adult Black-throated Diver (*Colymbus arcticus*) from Sweden, presented by Miss Hibbert-Ware; the specimen had been shot by Dr. Goethe in August 1922, in full breeding plumage, and preserved as a skin; since its accession it has been mounted as a set-up specimen in the Museum.

- b. A Scarlet Ibis (*Eudocimus ruber*), presented as a skin by Miss E. M. Heath, and set-up in the Museum.
- c. A Collection of Phanerogams made by Dr. Anthony Southby (*olim* Gapper), of Bridgwater, Somerset, between 1822 and 1837, and presented by Miss Southby.
- d. A number of named Seaweeds from Jersey, and unnamed seaweeds from Australia, presented by Miss Southby.
- e. A living Kestrel ♂ caught the previous day in a trap in a garden in Croydon Road, Plaistow: the bird was uninjured, and was liberated in the open-air at the close of the meeting.

The President exhibited, and described, a set of photographs of Birch seeds, some normal and others showing the results of attacks of the gall-insect *Oligotrophus betulæ*. He also exhibited a number of lichens collected in Tasmania by Mr. W. A. Weymouth, and based upon them some remarks on the distribution of lichens in the Arctic, Antarctic and Temperate zones. Reference was made to Hue's account of the specimens collected by the Expédition Antarctique Française in 1903-1905, when large blocks of rock with lichens growing upon them were collected: from these Hue determined 111 species that were truly Antarctic forms, of which 90 were new species; hence, it may be concluded that in Antarctica there is a special lichen-flora. Although there is a great similarity in the lichen-genera throughout the Temperate Zones, certain genera are specially noticeable for their abundance in species and in quantity in certain countries; as, for example, the genus *Sticta* in Australia, Tasmania and New Zealand.

The lichens exhibited were:—

Peltigera polydactyla.

Sticta dissimulata, *S. fossulata*, *S. freycinetii*, *S. orgamæa*, *S. rubella*, *S. subcoriacea*, *S. variabilis*.

Parmelia placotrodoides, *P. tenuirima*, *P. imitatrix*.

Ramalina leiodea, *R. pollinaria*.

Physcia subexilis.

Stereocaulon ramulosum.

Cladonia aggregata, *C. retepora*.

Lecidea cinnabarina.

Melaspilea lentiginosa.

Cænogonium implexum.

The President called upon Mr. Hugh Boyd Watt, who read a paper on "The American Grey Squirrel (*Sciurus carolinensis*) in Britain," in illustration of which museum-specimens of the Grey Squirrel, as well as of the Common Squirrel and of the Continental race, were exhibited. At the close of an interesting paper a discussion ensued, in which Messrs. Whitaker, Nicholson and Lambert took part. The author replied to questions and the President expressed the thanks of the Meeting to Mr. Watt for his communication.

In view of the lateness of the hour the reading of a paper on "A Third Annotated Copy of Warner's 'Plantæ Woodfordienses,' " by the Hon. Secretary, was postponed. Mr. Thompson announced, amidst applause, that Mr. J. J. Holdsworth had presented his copy of the "Plantæ," containing Benjamin M. Forster's MS. annotations, to the Club's Library.

The meeting was then declared closed.

VISIT TO LEYTON (55TH MEETING).

SATURDAY, 10TH FEBRUARY, 1923.

This visit was arranged by Mr. Z. Moon, F.R.Hist.S., Chief Librarian to the Leyton Urban District Council, with the two-fold design of enabling our Members to inspect the old Leyton Parish Church and the extensive collection of Essex prints belonging to the Public Library.

The party, consisting of over 40 persons, assembled at the Central Library shortly after 2 o'clock and proceeded, under Mr. Moon's guidance, to the Parish Church of St. Mary. Here, with the church-bells pealing in its honour, it was welcomed by the genial Vicar, the Rev. J. Glass, rural dean, who gave a chatty address on the sacred building; he referred to the atmosphere of the past evoked therein, and spoke of the great men who had been connected with Leyton in past times, such as the Hicks family of "Ruckholts," John Strype, and the Bosanquet family, and there was a connection with the family of Oliver Cromwell, some of whom were patrons of the living. Mr. Glass mentioned that the galleries which still exist in the Church originally accommodated the gentry's servants, the men servants being placed in the west gallery, the women domestics in the south aisle of the chancel; he also remarked on the fact that the surpliced choir and organ are still placed, as in pre-Reformation days, in the gallery at the west end of the nave, instead of in the chancel as is so usual nowadays. The parish registers and the fine silver-gilt church-plate were shown.

Mr. Minty, the honorary architect to the fabric, kindly conducted the visitors round the church, and pointed out the more noteworthy monuments, which include some elaborate 16th century ones to members of the Hicks family, and two charming sculptures by John Flaxman, R.A.

Mr. S. J. Barns contributes the following account of—

LEYTON CHURCH AND JOHN STRYPE.

So far as the fabric is concerned successive rebuildings have completely destroyed all that is really ancient in the mother church of Leyton, dedicated to St. Mary-the-Virgin. Yet on entering the visitor is in a subtle, indefinable way, ushered into the very atmosphere of antiquity. The associations of the site and the many monuments from the earlier church contribute to this feeling.

The church is a very ordinary building in the Perpendicular Style and consists of chancel, nave, north and south aisles, south porch and western tower. The tower is the oldest existing part of the present church, and was built in 1658, being one of the few extant examples of church building under the Commonwealth. The material employed throughout is brick, the tower being surmounted by a small wooden cupola.

The fittings and associations of the church are of very great interest. The oldest thing in the church is one of the six bells, the sixth, which is of the fourteenth century, and is inscribed in Lombardic capitals—

"Domine exaudi oracionem meum et clamor meus ad te veniat."

The fifth is by William Wightman, 1694.

Five brasses remain, all of which are now mural, the earliest being a small figure, with unbraided hair, of Ursula, daughter of Gaspar, 1493, now on the east wall, to which is also affixed an inscription to Lady Mary Kyngestone, 1548; another, with the kneeling figures of man and wife in civil dress, with seven sons and five daughters, is to Elizabeth, wife of Tobias Wood, 1620.

On the south wall is an inscription recording the bequest of Robert Rampston, 1585, identical in terms with similar plates in Woodford, Walthamstow, and other adjacent churches. The last brass is on the west wall and is to Sir Edward Holmden, 1616.

The most important, as well as the most imposing, monuments are those to the Hicks family. The first is a wall monument, commemorating Sir Michael Hicks, 1612, and Elizabeth his wife, with panelled base and reclining figures of man in armour and woman in long cloak; at the back of each is a semi-circular arched panel and below two shields of arms. The other monument commemorates Sir William Hicks, Bart., 1680, and Sir William Hicks, his son, 1703, and is a large marble monument with the reclining effigy of the first-named grasping a staff, or truncheon, in his hand, significant of his Lieutenantship of the Forest, and the standing figures of his son, and his son's wife, Marthagnes.

Mural monuments of lesser pretensions perpetuate the memory of Charles Goring, Lord Hurst Perpoint and Earl of Norwich, 1670, second and last Lord Goring and successor to his brother, the famous Royalist cavalry commander who figured prominently in the Siege of Colchester; and Andrew Redich, 1603, with cartouche of arms. There are many others of later date, including one to John Strange, the celebrated lawyer, and two by the famous sculptor Flaxman.

The poor box, in the south aisle, of seventeenth century date, is also worthy of notice.

The communion plate, although none of it ancient, is a very nice collection, and consists of:—

1 plate, inscribed "Leyton Church, given by William Dunster, Church Warden, 1733."

1 chalice, inscribed "The gift of Francis Creuze, of Laytonstone, 1775."

1 flagon

1 chalice

2 small patens

1 large plate

} inscribed "Leyton Parish 1794."

4 large plates inscribed "A bequest by Mrs. A. H. M. Daubuz For the use of the Church of the parish of Leyton, Essex, 1836."

1 Brass plate, inscribed "St. Mary's, Leyton, Essex, Easter, 1884."

William Dunster was churchwarden in 1733 and 1734. Francis Creuze was elected to serve as churchwarden in 1775, but was excused on presenting a piece of plate to the altar.

The Registers, from the number of important people who have made their home in the parish, are of exceptional interest. They begin for baptisms and marriages in 1575 and for burials in 1617.

In the south aisle is a small stone, with the words:—

JOHN STRIPE,

Vicar

1696.

Brief as is this inscription, it incorporates two errors, for, so far as I can discover, there is no warranty for this spelling of the name, which is invariably written, Strype; and strangely enough this erudite minister, who served the parish for so long a period of time, does not appear to have ever been formally inducted into the living. He was born on Nov. 1, 1643,

in Strype's Court, Petticoat Lane, as is generally believed, although the late Mr. A. P. Wire, in the *Essex Review*, vol. viii., October, 1899, says Houndsditch, but quotes no authority for the statement. Educated at St. Paul's School, Strype proceeded to Jesus College, Cambridge, where he matriculated on July 5, 1662; and subsequently migrating to St. Catherine's Hall, he graduated B.A. in 1665 and M.A. 1669, afterwards being also incorporated M.A. at Oxford. Entering the church he was appointed to the perpetual curacy of Theydon Bois in July 1669 and in November of the same year, at the invitation of the inhabitants, he became minister of Leyton, and continued so to serve for no less than 68 years, until his death in 1737. For a portion of this time he also held the sinecure vicarage of West Tarring in Sussex, and was lecturer of Hackney until 1724. Bowed with the weight of increasing age and infirmity, the last few years of his life were spent in the home of his grand-daughter, Susan, at Hackney, where he died on December 11, 1737, aged 94 years 1 month and 10 days, and was buried in Leyton Church, where the best years of his life had been spent and where he had faithfully ministered so long. His literary activity was enormous, for in addition to sermons, he wrote and published many weighty volumes, the material for which he collected with infinite labour and pains. The most important of his works are the lives of three Archbishops of Canterbury, Thomas Cranmer, Matthew Parker and John Whitgift, and his *Ecclesiastical Memorials* and *Annals of the Reformation*, the former in three folio volumes and the latter in four; but he is perhaps most widely known as the continuator of Stow's *Survey of London*, wherein he gives a very full account of Leyton Church.

Before leaving the church our President thanked Mr. Glass in the name of the Club for his kindly welcome.

On the return walk to the Town Hall, some of the party took the opportunity to inspect the Church House, formerly the vicarage, a small unpretentious Georgian building, where John Strype, the historian, resided during his long ministry of the parish, which lasted for sixty-eight years from 1669 onwards.

At the Town Hall the party was received and welcomed by the Chairman of the Urban District Council (Mr. Councillor F. J. Cobb, J.P.) and the chairman of the Libraries Committee (Mr. Councillor A. J. Allanson). The two members of Parliament for Leyton, Mr. E. E. Alexander, member for Leyton (East), and Mr. J. D. Cassels, K.C., member for Leyton (West) were also present with the party. In the Council Chamber an exhibition of old Essex prints had been arranged for the benefit of the visitors by Mr. Moon and his assistant, and these attracted much interested attention.

Afternoon tea was kindly provided for the party in the Councillors' Room at the Town Hall at 5 o'clock, after which some further time was enjoyably spent in inspecting the print exhibition.

The President expressed the thanks of the party to all who had contributed to the magnificent reception which had been accorded to the Club that afternoon, both at the Parish Church and at the Town Hall, and for the generous hospitality shown to the party; and he referred especially to Mr. Moon, upon whom the brunt of the work in organising such a successful meeting and exhibition had fallen. Mr. Moon replied suitably, and the visitors then took leave.

ORDINARY MEETING (559TH MEETING).

SATURDAY, 24TH FEBRUARY, 1923.

This meeting was held on the above afternoon in the Physical Lecture Theatre of the Municipal College, Romford Road, Stratford, with the President, Mr. Robert Paulson, F.L.S., F.R.M.S., in the chair. Forty-seven members were present.

Mrs. M. L. Chamen, of *Millfield, near Brentwood*, and

Mr. J. H. McNulty, of 22, *Kenninghall Road, Clapton, E.5*, were elected members of the Club.

In anticipation of the approaching annual meeting nominations were invited to fill vacancies on the Council. Four existing members were due to retire in rotation, viz., Mrs. J. E. Scourfield, Mr. Victor Taylor, Mr. J. M. Wood and Dr. F. M. Turner; in addition, there were two vacancies, owing to the death of Mr. T. W. Reader and the resignation of Dr. Airey. The following nominations were then made:—

1. Mr. J. Mackworth Wood, proposed by Mr. Whitaker, seconded by Mr. Scourfield.
2. Mrs. J. E. Scourfield, proposed by Miss G. Lister, seconded by Mr. Whitaker.
3. Dr. F. M. Turner, proposed by Mrs. Thompson, seconded by Mr. Bestow.
4. Miss E. Prince, proposed by Miss Hibbert-Ware, seconded by Mr. Nicholson.
5. Mr. W. H. Daun, proposed by Mrs. Boyd Watt, seconded by Mr. Nunn.
6. Mr. F. W. Thorington, proposed by Mr. Nicholson, seconded by Miss Hibbert-Ware.
7. Miss E. F. Noel, proposed by Mrs. Scourfield, seconded by Mrs. Boyd Watt.
8. Mr. Walter Fox, proposed by Mr. Avery, seconded by Mr. Paulson.
9. Mr. Frank Lambert, proposed by Mr. Thompson, seconded by Mr. Avery.

The Hon. Secretary announced the approaching retirement, after three year's service, of the President, and referred appreciatively to Mr. Paulson's work for the Club during his term of office.

The following Officers were nominated by the Council:—

As President, Dr. Arthur Smith Woodward, F.R.S., Presidt. L.S., F.G.S., F.Z.S.

As Hon. Treasurer, Mr. J. Avery.

As Hon. Librarian, Mr. F. J. Brand.

As Hon. Secretary and Editor, Mr. Percy Thompson.

As Hon. Asst. Curator at Queen Elizabeth's Lodge, Miss V. Oxley.

As Hon. Auditor, Mr. C. Nicholson.

On the motion of Miss Wyness, seconded by Miss Evitt, Mrs. Whitwell was nominated as Second Auditor.

Mr. Avery exhibited some living flowers of *Billbergia nutans*, a Bromeliaceous plant from Brazil: he also exhibited a series of 24 sheets of original drawings and proof impressions of the illustrations to Godman's *Norman Architecture in Essex*, and *Mediæval Architecture in Essex*.

The Hon. Secretary exhibited seven MS. volumes of botanical notes by Edward Forster, in which Forster had systematically recorded the plants, both phanerogams and cryptogams, met with during his many journeys through various parts of the country. The volumes were now the property of the Saffron Walden Museum, and the notes had evidently been made use of by G. S. Gibson, in the preparation of his *Flora of Essex*.

Thanks were voted to the several exhibitors.

Mr. J. H. Owen then gave interesting lectures on two ornithological subjects:—

(a) "Some Observations on the Great Crested Grebe,"

(b) "Notes on the Use of the Wings and Tail by the Hen Sparrowhawk to protect the Nestlings from the Sun,"

showing a large number of excellent lantern photographs, taken by himself, in illustration of his remarks.

A discussion ensued, and the President expressed the warm thanks of the meeting to Mr. Owen for his two communications.

MOSS HUNT IN EPPING FOREST (560TH MEETING).

SATURDAY, 17TH MARCH, 1923.

An unexpectedly fine sunny day, following a long period of rainy weather, tempted over 30 members and friends to join this field-meeting, and justified the somewhat dubious experiment of an all-day out-door meeting at so early a date. A cold easterly wind was scarcely felt in the woodlands, and the route chosen, from east to west, was favourable to its avoidance.

The party assembled at Theydon Bois Station at 10.50 o'clock, and included as referees Mr. W. R. Sherrin, Mr. St. John Marriott and other members versed in the bryophytes.

Passing through the village, the Forest was entered at Oak Hill, and thence the general direction was towards Woodredon Hill, avoiding roads and visiting most of the bogs on the way; thence turning south along the western side of the Forest to High Beach.

A Pygmy Shrew (*Sorex minutus*) was captured alive on a heath near the Epping New Road, and was liberated after inspection; a faint white patch of fur on the crown of its head was noticeable, this partial albinism is not uncommon in these animals.

The spring-like day had also awakened from its winter torpor a large Grass Snake, which was seen on the warm western slope below the Verderer's Path, but successfully evaded attempts at capture.

After tea at the Roserville Retreat at 5 o'clock, a short meeting of the Club was held, when one candidate was nominated for membership.

The Hon. Secretary made some remarks on the finds of the day; he announced that 52 species and 2 varieties of mosses, and 13 hepatics, had been recorded, the full list being:—

MOSSSES.

Sphagnum cymbifolium. (Ehrh.)

S. acutifolium. (Russn.)

Tetraphis pellucida. (Hedw.)

Catharinaea undulata. (Web. and
Mohr.)

Polytrichum aloides. (Hedw.)

P. piliferum. (Schreb.)

P. juniperinum. (Will'd.)

P. formosum. (Hedw.)

P. commune. (L.)

<i>Ceratodon purpureus</i> . (Brid.)	<i>Mnium affine</i> (Bland) var. <i>rugicum</i> . (B. & S.)
<i>Dicranella heteromalla</i> . (Schp.)	<i>M. rostratum</i> . (Schräd.)
<i>Campylopus pyriformis</i> . (Brid.)	<i>M. undulatum</i> . (L.)
<i>Dicranum scoparium</i> . (Hedw.)	<i>M. hornum</i> . (L.)
<i>Leucobryum glaucum</i> . (Schp.)	<i>M. punctatum</i> (L.)
<i>Fissidens bryoides</i> . (Hedw.)	<i>Camptothecium sericeum</i> . (Kindb.)
<i>F. taxifolius</i> (do.)	<i>Brachythecium albicans</i> . (B. & S.)
<i>Grimmia pulvinata</i> . (Smith.)	<i>B. rutabulum</i> . (do.)
<i>Tortula muralis</i> . (Hedw.)	<i>B. velutinum</i> . (do.)
<i>Barbula rubella</i> . (Mitt.)	<i>B. purum</i> . (Dixon.)
<i>B. convoluta</i> . (Hedw.) var. <i>Sardoa</i> . (B. & S.)	<i>Eurhynchium prælongum</i> . (Hobkirk.)
<i>Orthotrichum diaphanum</i> . (Schräd.)	<i>Plagiothecium elegans</i> . (Sull.)
<i>Funaria hygrometrica</i> . (Sibth.)	<i>P. denticulatum</i> . (B. & S.)
<i>Aulacomnium palustre</i> . (Schwaeg.)	<i>P. silvaticum</i> . (do.)
<i>A. androgynum</i> . (do.)	<i>P. undulatum</i> . (do.)
<i>Bartramia pomiformis</i> . (Hedw.)	<i>Amblystegium serpens</i> . (do.)
<i>Webera nutans</i> . (Hedw.)	<i>Hypnum cupressiforme</i> . (L.)
<i>Webera prolifera</i> . (Bryhn.)	<i>Ditto</i> var. <i>resupinatum</i> . (Schp.)
<i>Bryum caespiticium</i> . (L.)	<i>Ditto</i> var. <i>ericetorum</i> . (B. & S.)
<i>B. capillare</i> . (L.)	<i>H. cordifolium</i> . (Hedw.)
<i>B. erythrocarpum</i> . (Schwaeg.)	<i>H. cuspidatum</i> . (Lindb.)
<i>B. argenteum</i> . (L.)	<i>H. Schreberi</i> . (Will'd.)
	<i>Hylocomium sugarrosum</i> . (B. & S.)

HEPATICS.

<i>Marchantia polymorpha</i> . (L.) Male and female plants, with gemmæ- cups.	<i>Lophocolea bidentata</i> . (L.) Dum.
<i>Metzgeria furcata</i> . (L.) Dum.	<i>L. heterophylla</i> . (Schräd.) Dum. (c. fr.)
<i>Pellia epiphylla</i> . (L.) Corda.	<i>Cephalozia bicuspidata</i> . (L.) Dum.
<i>Aplozia crenulata</i> .	<i>Calypogeia Trichomanis</i> . (L.) Corda.
<i>Gymnocolea inflata</i> . (Huds.) Dum.	<i>C. fissa</i> (L.) Raddi.
<i>Lophozia ventricosa</i> . (Dicks.) Dum.	<i>Lepidozia reptans</i> . (L.) Dum.
	<i>Diplophyllum albicans</i> . (L.) Dum.

Of these, the most interesting are *Barbula convoluta* var. *Sardoa*, which was found on a brick wall-top in Theydon Bois village, *Webera prolifera*, *Mnium affine* var. *rugicum* and *Calypogeia fissa*, all of which are vouched for by our conductors, Messrs. St. John Marriott and W. R. Sherrin; the *Mnium* appears to be a new record for Essex.

THE 561ST ORDINARY MEETING AND THE ANNUAL MEETING (561ST AND 562ND MEETINGS).

SATURDAY, 24TH MARCH, 1923.

These Meetings were held in the Physical Lecture Theatre of the Municipal College, Romford Road, Stratford, at three o'clock on the above afternoon, Mr. Robert Paulson, F.L.S., F.R.M.S., president, in the chair. Fifty-five members attended.

Miss L. M. Bateman, of 38, *Church Hill Road, Walthamstow, E.17*, and Dr. W. A. Bullough, M.B., M.Sc., D.P.H., of 26, *High Street, Chelmsford*, were elected members of the Club.

Mr. Avery exhibited a series of over 40 original water-colour drawings of the monuments in Barking, East Ham and West Ham churches, recently purchased by him at the sale of the famous Gardner collection at Messrs. Sotheby's.

The business of the Annual Meeting was then taken.

After the Minutes of the last Annual Meeting had been duly confirmed, the Hon. Secretary read the report of the Council for 1922-23. Miss A. Lorrain Smith moved that the Report be received and adopted; Mr. Boyd Watt seconded, and the motion was carried unanimously.

The Hon. Treasurer presented his statement of the Club's accounts for 1922, and moved formally that the accounts be received. Mr. Barns seconded. Carried *nem con.*

The Hon. Secretary reported that no other nominations had been received beyond those made at the meeting on February 24th, for the several offices of the Club. The President accordingly declared the persons then nominated as duly elected, viz. :—

President, Dr. Arthur Smith Woodward, F.R.S., Pres.L.S., F.G.S., F.Z.S.,

Hon. Treasurer, Mr. John Avery, F.C.A.

Hon. Librarian, Mr. F. J. Brand.

Hon. Secretary, Mr. Percy Thompson, F.L.S.

Hon. Editor, Mr. Percy Thompson, F.L.S.

Hon. Asst. Curator at Queen Elizabeth's Lodge, Miss V. Oxley.

Hon. Auditors, Mr. C. Nicholson and Mrs. C. Whitwell.

The members of the Cole Committee were re-elected for another year.

The meeting then proceeded to ballot for new members of Council, the President appointing Mr. Colney Campbell and Miss E. Evitt as scrutineers, who proceeded to count the votes.

Before leaving the chair the President referred to the work of the Club during his term of office, and showed that the ideas of the Founder of the Club were still being loyally carried on. Mr. Paulson then resigned the chair to the new President, Dr. A. Smith Woodward, who was warmly applauded on taking his seat. On behalf of the general body of members, Mr. Whitaker thanked the retiring President for the work he had done for the Club during the past three years, and proposed a hearty vote of thanks to him; Mr. Hazzledine Warren seconded the motion, which was carried by acclamation.

The Retiring President then read his address on "The Fungus-root (*Mycorrhiza*) of the Birch and other Trees," which he illustrated by various coloured lantern-photographs and by the exhibition of specimens. At the conclusion of the address the new President called upon Miss Lorrain Smith, who moved that the thanks of the Club be given to the retiring President, and that he be requested to allow his address to be published in the Club's journal. Mr. Avery seconded the motion, which was carried *nem. con.* with applause.

The President then read a certificate signed by the two scrutineers, giving the result of the ballot for new Members of Council, and he declared the following to have been duly elected, viz. :—Mrs. J. E. Scourfield, Dr. F. M. Turner, Mr. J. M. Wood, Miss E. Prince, Mr. Frank Lambert and Mr. W. H. Daun.

The meeting was then declared at an end.

ESSEX FIELD CLUB.**REPORT OF THE COUNCIL FOR 1922-23.**

Presented to the Annual Meeting on 24th March, 1923.

LADIES AND GENTLEMEN,

Your Council has pleasure in reporting that the work of the Club has progressed steadily and satisfactorily during the past year, and the attendances both at the indoor and field meetings have been well maintained. In addition to the usual five winter meetings at Stratford, eleven field meetings and visits to museums have been held; we have to thank Mr. and Mrs. Avery, Mr. and Mrs. Briscoe, Mr. and Mrs. Gerald Buxton, Mr. and Mrs. Keeves, Mr. and Mrs. G. Morris, and the Librarian to the Leyton District Council for kindly hospitality extended on these occasions.

We have to deplore the loss by death of several eminent Members since our last annual meeting. Professor G. S. Boulger and Mr. Thomas Vincent Holmes, both past presidents of our Club, Mr. Thomas W. Reader, a valued Member of Council, and last, but not least, our founder, Mr. William Cole, have all left us during the year. As regards our founder, your Council proposes to provide a suitable memorial to his memory with monies in its control, being the balance of subscriptions made to the deceased's Pension Fund.

The present membership of the Club stands at 310, consisting of 17 honorary and 293 ordinary members.

During the year a change has taken place in the personnel of the Stratford Museum. Mr. Hardy, the capable and energetic assistant, has resigned on leaving for Canada, and a successor, Mr. Frank Jane, has just been appointed. Structural alterations to the Curator's room and Library have just been necessitated by an extension of the adjoining College.

Many accessions have been made to the collections during the past twelve months; especially noteworthy among these is the fine collection of British Lepidoptera bequeathed by the late Mr. William Cole, and a large number of books, comprising 43 bound volumes and 7 pamphlets, presented by the executor of the late Mr. T. V. Holmes. The Library now includes some 4758 bound volumes: 87 volumes have been bound during the past year, and 20 others rebound or repaired.

Our Pictorial Survey of the County is growing apace in Miss Greaves' capable hands. Apart from a large amount of material which has not yet been mounted, no less than 749 prints or watercolour drawings, 821 photographs, besides picture postcards, maps and other illustrations, totalling in all over 2,100 items, are included in the mounted collection of Essex pictorial records. Messrs. Daymond and Nunn have been generous donors to the photographic section.

In response to a request made by the organisers of a special Stratford "Education Week" in June last, the Club co-operated by arranging special exhibitions and lectures at the Museum and conducted nature-rambles in Epping Forest: and received the thanks of the promoters for the help so afforded.

The Club's museum at Queen Elizabeth's Lodge, Chingford, has been cared for by the recent appointment of Miss Vera Oxley as honorary assistant curator.

Your Council has appointed a committee, composed of Miss G. Lister, Miss E. Prince, Mr. R. Paulson and Mr. P. Thompson, to draw up a revised list of the plants of the Epping Forest district, and invites the active co-operation of Members in securing accurate records of the rarer plants.

The President, Mr. Robert Paulson, resigns the chair after three years' service, and your Council, in welcoming his successor, desires to record its grateful thanks to Mr. Paulson for his constant interest in, and work for, the Club and his unfailing courtesy in the chair.

Lastly, your Council desires to express its thanks to the Officers of the Club and to the many private members who have, by gifts or personal service, helped on the work of the Club during the past year.

A Bird Sanctuary in the Lea Valley. All nature-lovers will rejoice to hear that, as the outcome of representations made by the Essex Field Club and kindred societies, the Metropolitan Water Board has decided to abandon the practice of allowing wild-fowl to be shot on its Reservoirs in the Lea Valley. The President and Hon. Secretary of the Club attended as members of a deputation before a Committee of the Board on July 4th last to urge this step, with the above happy result. EDITOR.

More Annotations by Edward Forster.—An interesting recent addition to the Stratford Museum Library is a copy of Turner and Dillwyns' *Botanist's Guide through England and Wales*, 1805, in 2 vols., 8vo, which has just been acquired through the trade.

The volumes in question were until lately in the library of the late Prof. G. S. Boulger, and they belonged originally to our celebrated Essex botanist, Edward Forster, junr., whose autograph appears on the flyleaf to each volume; the books were presentation-copies to Forster from the authors, to whom he had given help in the compilation of the work. Later, the volumes became the property of William and Caroline Pamplin, the former's autograph also occurring on the flyleaf in each case.

Edward Forster has followed his usual custom of having the books interleaved with blank sheets throughout; he has inserted in MS. numerous personal records of the various plants listed, and has also frequently elaborated his own records as printed by the authors in the volumes.

PERCY THOMPSON.

An Eighteenth Century Measurement of the Fairlop Oak.—"In the morning [of 19th April 1748] I went with Mr. Warner and some English gentlemen to the places which lay immediately to the east of Woodford . . . Mr. Warner went out . . . especially to show us an oak tree, which he said was one of the thickest oaks he had seen in England. We measured the periphery of the trunk, four feet above the ground, when we found that this oak was 30 feet round . . . ! The oak stood in Barking parish, and a fair used formerly to be held under it. Some of the branches were now withered."

PETER KALM: "*Resa til Norra America*," I. 1753.

PUBLICATIONS of the ESSEX FIELD CLUB.

The specially-valuable feature of the Publications of the Club is that they are almost wholly local in character. The volumes (comprising over 6,000 pages) contain hundreds of papers on the Natural History, Geology, and Pre-historic Archæology of Essex. The articles are of the greatest interest to all persons having any regard for the County, and the scientific accuracy and detail of a large proportion of them make them of value also to students of the subjects named living elsewhere.

The publications are all of demy octavo size. Nearly all contain numerous illustrations, in addition to plates. All are still in print, but some are becoming *very rare*.

“TRANSACTIONS” and “PROCEEDINGS” (in parts).

This series, which ran from 1881 to 1886, is no longer published, having been superseded by the *Essex Naturalist* (see below).

Volume.	Date.	Pages.	Plates.	Price.	Complete Set
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Vol. XX.—Part V.]

[OCT. 1923—MARCH 1924.

The Essex Naturalist:

BEING THE JOURNAL OF THE
ESSEX FIELD CLUB.

EDITED BY PERCY THOMPSON, F.L.S., *Honorary Secretary.*

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AND QUEEN ELIZABETH'S LODGE, CHINGFORD.

(Concluded from page 217).

In his will, now at Somerset House, Warner desires to be buried in the brick grave in Woodford churchyard near the chancel door, where the body of his nephew John Leigh Warner was deposited *pro tempore* in 1765, it being the property of his brother Robert. He desires to be carried to the grave by six men, preference being given to those employed in his garden, to each of whom he bequeaths "a suit of cloathes such as working-men wear on Sundays." He leaves all his books and all his drawings and prints relating to Botany and Natural History, together with his copper book-plate to the Rev. George Wyndham, Warden of Wadham College, for the college, desiring that his name may be kept in the books when rebound; and in the same manner he bequeaths £300 to be invested in Government or other securities, the interest to be applied to an exhibition at the college, tenable for seven years, by eight months' residence in each year, by the presentation of fifty dried plants different from one another and from those of the preceding years to the University Herbarium, and by a certificate of proficiency from the Professor of Botany. He leaves £50 to the poor of Woodford, the interest on which is to be distributed by the Rector on or about New Year's Day; and as he had been elected a Director of the East India Company in 1760, he leaves, "as is customary," £100 to their hospital at Poplar; £100 to the London Hospital; various legacies to servants; his "gold watch and £100 to Thomas Jervoise Clarke, eldest son of Jervoise Clarke of Hanover Square and my niece his late wife Kitty Clarke as a token of love and esteem"; and rings to Robert and Samuel, the second and third sons. To Garrick he leaves £50, besides the bequest of his papers before-mentioned; and the residue of his property, including "Harts" and his land in Clerkenwell, in trust to Dr. Wyndham and his other executors for the use of Jervoise Clarke during his life and, at his death, of his second son Robert and his heirs, or failing them, to the third son Samuel. The codicil, besides the alteration as to the Shakesperian papers above alluded to, leaves the property at Jervoise Clarke's disposal to his second or third son; and bequeaths a legacy to Mr. John Channing (one of the friends mentioned in the Preface to the *Plantæ*

Woodfordienses), thanking him especially for his care of the testator's health, he being obviously his medical attendant.

As to these bequests it may be noted that the book plate alluded to bears the arms before described with the crescent as difference for a second son, a horse's head ermine to dexter as crest, on an esquire's helmet to dexter, and the owner's name : that the Wadham endowment now consists of £343 : 5 : 7 Consols,



FIG. 1.—RICHARD WARNER'S BOOKPLATE.

producing £10 : 5 : 11 annually, which, Mr. Thorley informs me, is by a statute of the late University Commissioners merged in a general Exhibition Fund : and that Nichols was misinformed when he wrote (*loc. cit.*), " If I am not misinformed, he left to the same Society a small annual stipend to maintain a botanical lecture."

Among the books at Wadham College are two volumes labelled *Hortus siccus*, but their contents are meagre, unnamed and

valueless. There is also a collection of mosses, lichens, etc., made by Warner, and presented by Sir Jervoise Clarke Jervoise, in the Museum of the Essex Field Club.

Among Warner's books at Wadham College are several editions of Shakespeare interleaved, Beaumont and Fletcher, Spenser, Milton, Turner's *Herbal*, the *Great Herbal*, Parkinson's *Theatrum Botanicum*, Grew's *Anatomy of Plants*, Dillenius' *Historia Muscorum*, etc., but they contain no marginalia.

A very complete set of Hogarth's engravings is among Warner's collections at Idsworth, including that of *Columbus breaking the Egg*, which was given as a receipt to the subscribers to the *Analysis of Beauty*, published in 1753, and bears Warner's name in Hogarth's handwriting. We may well assume that the translator of Plautus, the would-be editor of Shakespeare, the friend of Garrick, and collector of prints would be known, not only to William Hogarth, but also to "the great 'lexicographer,' Samuel Johnson, the first edition of whose *Dictionary* is also among Warner's books.

Of Richard Warner as a man we have but little to add. Nichols informs us (*loc. cit.*), that, whilst he "most religiously observed" his father's old-fashioned custom of wearing black leather garters below the knee, he "in no other instance affected singularity"; and whichever of the two portraits at Idsworth may be his it represents a pleasant, good-tempered country gentleman of the eighteenth century, as he appears, from all accounts, to have been.

[Several correspondents have called attention to the fact that Professor Boulger evidently was not aware, at the time he wrote the foregoing article, of the English translation of Kalm's *Voyage* by Joseph Lucas. The translation did not appear until 1892, and Professor Boulger's compilation was written (as already mentioned in the editorial preface) mainly in the years 1883 to 1887, so that it is not to be wondered at that the latter contains no reference to the former.—ED.]

RICHARD WARNER AS VIEWED BY KALM.

BY BENJAMIN DAYDON JACKSON, R.N.O. (SWEDEN) ; HON. PH.D.,
ETC.

PETER KALM (1716-1779) was one of Linnæus's foremost pupils, "studiosus primarius" was the epithet used by the Swedish naturalist of him ; he travelled at the expense of Baron S. C. Bjelke in Sweden, Finland and Russia. In 1747, upon Linnæus's powerful initiative, Kalm was commissioned to embark on a journey to North America, which was completed in 1751. Previous to his departure, he was nominated the first occupant of the new Chair of Economy in the University of Abo, Finland, and took up his duties soon after his return to Europe, discharging them until his death.

On his way out he had to wait six months in England for a ship to Philadelphia, largely owing to the insecurity at sea due to the War of the Austrian Succession. During this enforced stay in our country, he not only acquired an excellent knowledge of English but travelled in the neighbourhood of London, to observe the farming appliances and customs, with the view of improving agricultural practice in Finland. He was most active in procuring seeds for Linnæus at Uppsala and in cultivating a friendship with prominent cultivators, particularly with Richard Warner (1711-1775), of Woodford, Essex, and Philip Miller (1691-1771), of the Apothecaries' garden at Chelsea. The extracts which are appended are translated from the letters which have been recently published in the 8th volume of the first section of the Linnean correspondence issued by the University of Uppsala with the help of the Swedish Government. Forty-one letters from him to his revered professor are printed in this volume but only one from Linnæus. Kalm explained that he had sewn up Linnæus's letters into a volume, and this probably perished in the terrible fire which devastated the town and University of Abo in 1827.

Attention has been recently directed to a list of American seeds which Kalm drew up on his return home ; see *Journ. Bot.*, lx. (1922), pp. 334-5.

LONDON, 24TH MARCH, 1748.

"From the Royal Academy of Science [in Stockholm] I received the address of Herr Abraham Spalding, to supply me with what I wanted ; if

the Academy had chosen amongst a thousand, it could not have chosen a better ; his kindness, his tender care for all that concerned my journey [to North America] in spite of his thousand items of business, has been so great, that I cannot express my gratitude for it ; nor can the Academy thank him sufficiently ; he it was who introduced me to a rich Englishman, allied [in sympathy] to Herr Archiater [Linnæus] and Baron Bjelke ; he is the greatest fancier in all the world for collecting and cultivating every kind of trees, plants and herbs ; from the sun's uprising until its going down (as we sing in our Psalm) and still later, he remains in his garden ; he has there 4 beautiful orangeries stuffed full with every kind of foreign plants, of which he has, in a word, abundance ; Herr Archiater can easily imagine how quickly we agreed ; while he was at home I was hardly absent from him one hour ; he shared with me all the seeds he had, and I think I may safely say, that in liberality as regards seeds, he surpassed both Herr Archiater and Herr Baron Bjelke ; I had many occasions of this, for when he had only a few of certain rare seeds which he could save last spring, say 4, he gave me 2, or one half ; the previously mentioned two gentlemen would hardly have gone so far as that ; this gentleman's name is Warner, a very learned man, and thorough in everything. I see that . . . when I return from America here 2 or 3 months next autumn . . . I should pass for a worthless fellow, if I could not get here a great abundance of all the foreign plants, either their seeds, or living, which occur in English orangeries and gardens ; it would be a shame to me if I did not get them, for the people are extremely good. . . .

"The seeds now sent are almost all selected, and a great part which Mr. Miller received last autumn from America ; a large part I collected with my own hands in Mr. Warner's splendid garden. Mr. Warner is Miller's special friend ; he will accompany me to him, to introduce me, and therefore as I am now come to London, I think of taking up my quarters a little way from Chelsea garden, to be always with him ; it will be useful in future to be his special friend. . . ."

STOCKHOLM, 23 MAY, 1751. . . . "Mr. Warner has been very fortunate in sowing the seeds I sent him earlier ; hardly a single one has failed, but I saw with pleasure the plants develope and thrive well in his garden ; they could not do better in their own native country. . . .

"At my stay in London I was so lucky as to get a considerable quantity of selected seeds from the East Indies, collected in their native localities in 1749 and 1750 ; that they are good I know from our common friend, Mr. Warner, the Englishman, who introduced me to the clergyman who, at his suggestion, gathered them ; he had, a few days before my arrival in London, sown some of the seeds, and before I left London nearly all had come up in his orangery, which I saw ; most of them were from Malabar, and bear the Malabar names on their wrappers though in European letters."

ABO, 5 JUNE, 1752. . . . "By the last post I received from my friend Warner in London some seeds which a friend of his collected in Bengal, in which land he had made a journey of more than 300 English miles up country ; Warner has reared them in his orangery, but neither he nor Miller knows to what genus they belong, he believes that they have never been in Europe before." [These seeds were sent to Stockholm, as Kalm in Finland had no hothouse in which to raise them.]

**A HITHERTO UNPUBLISHED LETTER FROM
RICHARD WARNER, OF WOODFORD,
TO LINNÆUS,**

VIRO EGREGIO ET VERE NOBILISSIMO
CAROLO LINNÆO EQUITI

s. pl. d.

RICARDUS WARNER.

Ad te tandem mitto quam lubenter Vir illustrissime, et omnibus Botanophilis in æternum colende, quale quale sit, sed tibi fortasse haud ingratum, Exemplar siccam Plantæ rarissimæ penes me, et quæ adhuc in Hypocausto meo apud Woodfordienses comitatu Essexiæ solummodo efflorescit. Hujusce Plantæ Titulus, secundum *Millerum* *Jasminum* foliis lanceolatis oppositis, calycibus acutis. De hac Planta, si plura velis, consulas ejusdem *Milleri* Dictionarium novissime editum in voce *Jasminum*, et Tabulam 180 Iconum Plantarum ejusdem Authoris, quibus Titulus est Anglice, A set of Figures adapted to the *Gardener's Dictionary*.

Exhibui amicissimo *Millero* meo Literas quibus me honestavisti; nec dubito quin ille, in hoc genere Doctrinæ egregius, te certiore fecerit: nam quod ad me attinet, non sum in hac scientia, tam magister quam tyro. A *Millero* meo te accepisse spero sicca exemplaria Plantarum illarum quæ a me in Literis vestris petiisti. Gratias insuper habeo atque ago pro Libellis quas mihi dono dedisti, quibus Titulus *Flora Anglica*, opus vere doctum et haud te indignum.

Vale, vir ornatissime, et me existimari digneris tuæ eruditionis admodum observantissimam

Dabam Woodford

ex ædibus meis,

8. Id. Iulii, 1758.

TRANSLATION.

To the most excellent and truly noble

Carl Linnaeus

Richard Warner

desires the best health.

At last I am sending to you, most illustrious Sir (to be ever cherished by plant-lovers of whatever kind) but probably not unwelcome to you, a dried specimen of a rare plant in my collection which is still flowering in the soil of my stove at Woodford in the County of Essex. According to *Miller* the name of this plant is *Jasminum* . . . *acutis* [= *Gardenia jasminoides*, Ellis]. If you would like to know more about this plant you might consult *Miller's* newly-published "Dictionary," Art. *Jasminum*, tab. 180 of the author's figures of plants, whose title in English is "A set of figures adapted to the *Gardener's Dictionary*."

I have shown the letter with which you have honoured me to my friend *Miller*, nor do I doubt but he, skilled in this genus as he is, will satisfy you, for as regards myself, I am rather a beginner than a master in this science.

I hope you have received from Miller the dried specimens of those plants which you asked for in your letter. Moreover, I return you my thanks for the pamphlet which you have bestowed upon me, entitled "Flora Anglica," a truly learned work and by no means unworthy of you.

Farewell, most distinguished Sir, esteemed by me most worthily for your learning.

Given at my house at Woodford,

The 8th day before the Ides of July, 1758.

[= 8th July, 1758.]

THE NIGHT CRY OF THE REDWING.

By FREDERICK J. STUBBS.

THE Redwing is a familiar British bird, peculiar in many ways. The following remarks, while directed primarily to the nocturnal habits of the bird, will touch on several other points; two of these are, alas, controversial. For instance, there is the scientific name, which is always important when the student is in the habit of consulting the literature of past years and other countries. The most ancient name for the Redwing is *Turdus iliacus*, which was used by many of the ancient writers prior to Linnæus, and adopted by the latter systematist in his famous 10th edition of "Systemae Naturae," which is now accepted as the basis of our nomenclature. Some years ago it was discovered that Linnæus, rather hazy as to the differences between Song Thrush and Redwing, had confused these two species in his 10th edition. It has been suggested (*cf* "Ibis," 8th ser., vol. 4, pp. 665-67) that this confusion was nothing but a printer's error. At any rate, it was detected and corrected by Linnæus himself in the 12th edition. Unfortunately, certain modern purists in nomenclature insist that no allowance can be made for the error, and claim that we must use the name *Turdus musicus* for the Redwing. *T. musicus* is, of course, the traditionally correct name for the Song Thrush.

This is a subject on which I am not qualified to pass an opinion, but I mention it here, because some modern writers when using *Turdus musicus* are referring to the bird which we all agree in knowing as the Redwing. To save time and space I propose to use only the unambiguous English names in this paper.

The other controversy relates to the singing of the Redwing in this country. The question first attracted notice in the

Zoologist for 1864, and trouble has recurred ever since when the matter is mentioned. Some field students say that the Redwing sings frequently in England ; others deny it altogether. I do not want to enter into a controversy on this point, but I cannot avoid saying that I myself hold the singing of the Redwing to be a very familiar feature of English landscapes. The reason may be that I have always paid rather close attention to this common bird ; like those of Bullfinch or House Sparrow, its song is not one that forces itself on one's notice ; but when we begin to watch Redwings we soon detect how fond they are of singing on fine days.

The song varies in a remarkable way, a fact that has been noticed in the northern breeding haunts of the bird. The Redwing has, besides the song, at least three distinct calls. The rarest is an alarm note, a chuckle nearly as loud as the rattle of a Blackbird. Much more frequent is a soft, almost explosive " Chup " or " Yup," a note without any sibilant quality. The commonest call, and the most important now, is a shrill piping squeak or whistle, a sort of long-drawn-out " Seep " or " Tzee-e-e-p." Sometimes this is so thin as to resemble a common call of the Blackbird ; but I do not think it can ever be confused with the short " tzip " of the Thrush.

A remarkable fact, not to my knowledge ever discussed in the literature of birds, is that this " seep " of the Redwing is by far the commonest night-call to be heard in Great Britain ; and, moreover, there is no corner of this country where it may not be heard. Twelve years ago, in the *Zoologist* for 1911 (pp. 361-366), I drew attention to this curious habit of the Redwing and since then have accumulated a great number of additional observations. Many of these were made in Essex, where the Redwing is a common bird ; but the most valuable observations refer to the Pennine moors, places where the bird is never seen during the hours of daylight. I would like to refer the reader who happens to feel interested in the matter to this *Zoologist* paper, which contains particulars not necessary to quote here.

Perhaps our two most ubiquitous birds are the House Sparrow and the Cuckoo. Outside the towns there is no British locality without Cuckoos ; but the bird avoids urban districts where fields are scarce ; on the other hand, the House Sparrow finds

difficulty in existing in woodlands or moors remote from villages, or even in villages on sea-coasts. The Redwing, however, seems quite indifferent. From its arrival in autumn to its departure in spring we may hear its "seep" at night anywhere. I have frequently heard it distinctly above the midnight babel of a London street, and it is a common voice over wide moorlands, over grassy highlands such as those of Wales, or over wide estuaries and the "Narrow Seas."

That so familiar a note should attract attention is inevitable. Very many writers refer to the Redwing's voice being heard over town or country; and, in every instance, the comment or the implication is that the bird was engaged in its legitimate migrations. As a rule, the months of October and November are mentioned; some observers mention March and April also. My own opinion is that the call *may be heard any night from October to late March if the conditions are favourable for audition*. Sometimes we may stand or walk for half an hour or more without hearing a call; an entire night, again, may be blank. I estimate, from observations made in daylight, that the "seep" is audible to my ears up to a distance of about 700 yards; Redwings may be on the wing half a mile away and thus be inaudible. The most extraordinary of my experiences was on the night of the 24th March, 1922, when the calls were continuous from 11.0 p.m. to 1.0 a.m. I found that in ninety seconds one hundred distinct calls were audible, at all heights and all distances within the range of my ears. This happened on the outskirts of the industrial town of Oldham, on the Lancashire-Yorkshire boundary. That night, a tremendous number of birds were on the wing. Many of the voices were quite strange to me, but I detected Golden Plover, Curlew, Black-Headed Gull (a strange call for night-time!), Sanderling, Blackbird and Redwing.

This may, indeed, have been a real migratory movement. It is a well-ascertained fact that the Redwing does call on migration. I shall not here give my observations on this March night; but I was led to think that the travelling birds were not all moving in the same direction. All around, for miles, the cocks were crowing. It rather seemed as though something or other had upset the entire bird-population of this corner of England. The weather was wretched in the extreme, a gale with wet snow being succeeded at night by a swaying "Scotch mist."

In my 1911 paper I suggest that these nocturnal movements of the Redwing cannot all be migratory. Let us assume for the moment that they are. The Fieldfare, like the Redwing, breeds commonly in northern Europe, and is a common winter migrant to England ; in fact, it frequently out-numbers the Redwing in places where both species are well-known. To the best of my recollection I have not once heard any call of Fieldfare after dark. The voice of the Fieldfare is frequently mentioned in the reports of observers stationed at lighthouses. The Song Thrush is often on the wing after dark, even in the nesting season, when I hear its quick low " Tzip " at night. The " seep " call of the Blackbird, sometimes resembling the note of the Redwing, may also be heard occasionally, and I have noted the loud " bedtime chuckle " (so familiar in shrubberies as Blackbirds retire to roost) coming from a dark sky ; but the latter has been a rare experience. Assuming migration, why does the Redwing call on its inland migrations while the Fieldfare travels silently over-land ?

Nor is this the only difficulty. Once the bird has accomplished its migration from Scandinavia to England, it is one of the most sedentary of birds. It is a common and a sad observation that when their food supply fails the Redwings are reluctant to leave, and perish from starvation. This tragedy was notoriously obvious in Essex in the hard winters of 1916 and 1917, when a dozen carcasses might have been found in a day's walk. Such birds as Skylarks or Snipe are prompt to leave when the weather interferes with their feeding opportunities. This peculiar sedentary habit of the Redwing has been remarked by naturalists for a century or more. We sometimes encounter more or less vague statements relating to great movements between October and March, but probably these observations are based only on the nocturnal voices of the passing birds, although actual immigrations have been watched in Ireland.

There are, too, several other serious objections to the migration explanation. Since 1920 I have made a special study of the bird, and have, whenever possible, devoted a period each night to a listening vigil. My present house is on the outskirts of a large town, and stands about 750 feet above sea level ; exactly half a mile away a rocky summit is about 980 feet ; and,

between, the valley falls to about 630. This short walk, when Redwings are calling, proves easily that the birds are not flying in a straight (*i.e.*, horizontal) line—they may be fifty feet overhead as I cross the bottom of the valley, and yet the same voices may still be overhead when I reach the top of the hill. Within six miles or so there are many higher hills, reaching up to almost 2,000 feet. The Greenfield valley, for instance, is a cul-de-sac open only at one end; the other sides are walled in by a curved plateau 1,600 feet and more above sea level. All around are wide moors, devoid of grass or shrubs, and totally unsuitable for Redwings by day. These hills are crossed by high-roads, some of them reaching an elevation of 1,600 feet, then dropping to about 600 at the bottom of the valley. On a good night the calls of the Redwing are frequently heard in this valley below the level of the hill summits; and I have stood on a steep hill and heard birds passing below my level, and within a few seconds noticed other calls perhaps hundreds of feet overhead.

The evidence of my ears often suggested that these travellers were not all passing in the same direction, and in 1921 I decided to make observations through a prismatic field-glass focussed against a moonlit cloud. I quote from my note-book of the 17th October (1921):—"To-night many Redwings flying over. Moon with clouds. At 8.45, watching sky with glass, distinctly saw a Thrush-like bird flying across at right angles from N.E. to S.W. A few seconds later another in precisely the opposite direction; and, at 9.15, a third flew 'up' the field of the glass—E. to W. or thereabouts. At 8.30 heard 3 Redwings in 3 seconds; and some dozens during the night." Two observations may be added here. On that night I distinctly heard the voices of Song Thrushes—a few in number. And, from 8.30 to about 9.30 (while my visual observations were being made) I heard no Redwings.

I find that watching the sky through a field-glass is tiring work. Perhaps some reader may be able to suggest or to try a better method of visual observation. It seems to me that further observations may prove that I am right in thinking that these nocturnal Redwings are not migrants travelling from place to place, but that they are wandering aimlessly in the dark air, or perhaps in flocks flying around in regular evolutions.

Although the Song Thrush is so close to the Redwing in many ways, one difference can be noted. Flocks of Thrushes are always "loose," the birds hanging together in a disjointed flock. The Redwing frequently flocks as close as Starlings, and will often perform elaborate aerial manoeuvres after the manner of Starlings; in my experience these large movements, witnessed, of course, in daylight, are carried out silently. When in small flocks the birds often utter their "seep" call.

On closely comparing Thrush with Redwing a difference in the eye becomes noticeable. The Thrush has by far the bigger eye. This difference cannot easily be shown in figures, but my measurements are 5 mm. for Redwing and 6 mm. for Thrush. The difference is more apparent in the bones of the skull, where the rule can be placed on the frontal bone between the orbits. The space is 4 mm. in the Thrush, but 6 mm. in the Redwing. I do not think that size of eye is generally a safe guide to the habits of a bird; it may be in this case.

The Song Thrush is much more often noticed on migration than is the Redwing, although apparently this curious point has never attracted consideration. My impression is that for every hundred Thrushes met with at lighthouses or lightships there cannot be more than about thirty Redwings. The figures I have used have been drawn from such schedules as those published by the Committee on the Migration of Birds, those by Barrington on Migration in Ireland, Herluf Winge on Danish Lighthouses, Gaetke on Heligoland, and Dr. Eagle Clarke on British and other stations. For example, when Dr. Clarke spent a month on the Kentish Knock Lightship, off the Essex coast (17th September to 18th October, 1923) he did not record a single Redwing, although Song Thrushes were abundant. The date, of course, is not late enough for safe deductions to be made; but Gaetke, in his "Heligoland" speaks clearly of the comparative rarity of the Redwing and the extreme abundance of Song Thrushes.

In my 1911 paper I expressed the opinion that nocturnal Redwings flew only in fine weather—that is, on nights fairly free from wind. I would modify this opinion; I consider that, roughly speaking, the birds may be heard *any* night, without reference either to the weather or the state of the moon. On a stormy night the conditions are not suitable for outdoor vigils;

and, besides, the noise of the gale may drown all other sounds. Once or twice, however, I have detected beyond any doubt the "seep" of a Redwing in a lull in the storm. On still nights the clouds often form in strata, with clear air above and below; this is not always obvious in a lowland county, but is extremely noticeable during a walk on the Pennines, when a few minutes may be enough to carry one from a thick mist to a clear blue sky. I have an idea, not yet definitely a belief, that flying Redwings fly either below or above this stratum of cloud. It will be understood that a ten-mile walk after dark, over lonely moorland roads rising to 1,600 feet above sea level, is not always possible or desirable; one has to depend on chance observations or observations made on the 1,000 feet contour within a mile or so of the house.

Another strange fact is that the "seep" alone should be heard at night. During the daytime the "Chup" and the "seep" are used indifferently, but I cannot remember ever hearing the former note after dark. Occasionally, in Lancashire, many years ago, and in Essex during later years, I have made special visits to the favourite thickets where Redwings roost in large companies. I have watched the birds trooping in for the night, and have seen them settle to rest, remaining for a long time in the hope of detecting some movement in connection with their nocturnal rambles. An hour after all is still, the chance of hearing the aerial note is no greater than it would be if one stood on a wide moorland, or in Trafalgar Square; these visits have never added anything to my knowledge.

When do Redwings begin to fly? I hear them first when it is just too late to detect the passing birds; and I have often remarked that had they been half an hour earlier, I should have seen the birds against the sky; and, as I have often had the opportunity of noting, these flights continue all night, and cease when the day begins to lighten.

What can be the explanation? The only one that I can think of is that these flights are, so to speak, a form of song—a letting-off of superfluous energy. The Moorhen "sings" this way, careering around over town and country from March to July; but I do not think we can hope to hear Moorhens beyond a three-miles radius from their ordinary haunts. The Snipe, also, utters a "song" largely instrumental—much of the energy

is expended in flying around in a mile-wide circle, at all hours of the night. Such "songs" as these are confined to spring and summer. The Redwing's flights happen in winter.

My actual observations may give me the privilege of making a few speculations. I do not ask that they be taken as correct. But it will easily be seen that the explanation "Migration" cannot possibly fit in with my observations. We have to bear in mind the sedentary habit of the bird; there is no doubt that these nocturnal travellers are moving in different directions, and along paths that are certainly curved—dipping down into deep valleys, and so forth. My conception of migration is a great function carried out in an economical way. If, during a period when I have been hearing the call of the Redwing every night, I notice no variation in the numbers of Redwings observed by day in the surrounding fields, I am very reluctant to assume that the voices heard have been those of migrating birds.

From about 1916 onwards the Redwing was extremely scarce in most parts of England. The nocturnal notes were seldom heard then, but they gradually increased from 1919 to 1921, when, with me, they reached their maximum. Records last year were not quite so numerous; but in 1922 I had fewer opportunities of systematic nightly vigils, however short. I have kept this question in mind during my long and wide excursions into the literature of ornithology, both British and Continental. The majority of ornithologists either consider the subject to be quite beneath their notice; or, if mentioned at all, these nocturnal voices are summarily dismissed as coming from a notorious migrant.

To my mind, these shrill calls, coming so suddenly from the dark air, bring always an air of romance to the night. One may be sitting on the top of a 'bus that is waiting its turn to cross Piccadilly Circus; on one such occasion, I remember my fellow passengers glancing upwards as they heard the thin note of a Redwing close overhead. The second biggest "rush" I remember passed over Mile End Road at the busiest part of a Saturday night. When crossing a wide moor, with nothing in sight but the dark world and the stars above, the call seems equally wonderful. Even in lowland fields, past elms and woods and thick hedgerows, I cannot hear the bird without a sort of thrill of pleasure.

I have an idea that we are not quite so wise as our ancestors in a knowledge of this peculiarity of the Redwing. There are still in daily use, or to be found in old books, a great number of names for the Redwing. And all of them seem to be connected with the "seep" note :—"Swinepipe" is perhaps the commonest ; other variants are "Winepipe," "Windpipe," "Wingpipe," "Winnard," "Windle," "Wind Thrush," "Wingthrush," and "Wheenerd" ; the Germans call the bird "Weindrossel." We to-day call it Redwing. Many a naturalist cannot tell a Redwing from a Songthrush, so similar are they except to the student of birds—yet so inscrutably dissimilar when we begin to look below the concealing mask of plumage. As with so many other birds, we should understand the Redwing much better if we ignored its feathers entirely. The skin is the binding : the living bird is the real book, its pages printed in uncouth characters in a strange tongue, hard to read, difficult to comprehend. After quite thirty years' close study I have yet to learn the real meaning of one simple monosyllable from this ordinary bird—and there are so many other comely volumes waiting to be read !

THE BIRDS OF THE BLACKWATER VALLEY IN 1922 and 1923.

By WILLIAM E. GLEGG, F.Z.S.

THIS note, the second on the birds of the Essex rivers, is prepared with the object of showing what species may be observed to-day in these localities.

The late Mr. E. A. Fitch, in his guide to "Maldon and the River Blackwater," tells of the amazing wealth of bird-life at one time, apparently within the last fifty years, to be found in this part of the extensive Essex marshes. Some of his accounts are so remarkable that they may be repeated justifiably. "I have seen the sky darkened with wild geese covering a space of half-a-mile by a quarter-of-a-mile, as thick as manure spread upon the ground, and making a noise which I could only compare with fifty packs of hounds in full cry. I have also seen seven acres at low water covered with Widgeon, Curlew and Ducks, making such a noise that I could not hear my brother talking to me a few yards off. Colonel Russell was off the coast in his

yacht. He told me that he had sent off from Maldon to London upwards of two tons of geese." This statement is attributed to Mr. Thomas Kemble, of Runwell Hall. The author of this interesting guide cites instances of the "*authentic performances*" of the gunners. "Charles Hipsey of Maldon once shot 75 widgeon at one shot, and 12 to 15 more were picked up by other punters. . . . John Basham of Maldon has the gun with which Girtton of Tollesbury once bagged 50 coots at a single shot. Basham himself bagged 288 Oxbirds (Dunlin) at a single shot from a flock settled on the ice, and the gulls and crows took several dozen besides. Harry Handley of Maldon once shot 432 Oxbirds (Dunlin) in two successive shots in Stansgate Bay. John Basham, junr., of Maldon, shot 108 Marl (Knots) in one shot out of a flock resting on the mud flats near Bradwell Chapel. Charles Hipsey of Maldon shot 320 Knots in one shot, just as many birds as there were shots in his gun ($\frac{1}{2}$ lb. A.A. shot)." Enormous "bags" of black geese might be recorded. In "January, 1871, 14 guns shot 471 birds at once; 32 guns bagged 704 on another occasion, and 18 guns bagged 360."

In spite of the fact that such feats are [happily—Ed.] not likely to be equalled to-day, the results of my visits show that the Blackwater still holds out attractions to those interested in birds. By comparison the sister estuary, the Crouch, is tame, birds of most kinds being much less numerous. It is difficult to understand why there should be such a marked difference between the two rivers, which are within easy walking distance of each other. In connection with this it may be stated that the Blackwater has a greater extent of shallows than the Crouch, and this may have some influence on the feeding of the birds. In the writer's experience the Blackwater is the most interesting district for winter birds within the same distance of London.

My survey of the district was effected chiefly by day visits from London and Maldon was used generally as a step off, return being made sometimes from this station, or on other occasions from Southminster, as the light permitted. On one occasion I was overtaken by darkness with about two miles of high and bad sea-wall to traverse, an experience to be avoided. To work the more distant points round Bradwell and Tollesbury, a week-end was spent at each place. At the former I had the assistance of my friend, Mr. C. S. Bayne, and we were well satisfied with

our visit to this outlying corner of Essex. The whole of the sea-wall has been traversed, from Maldon to beyond St. Peters on the South and to Salcot on the North shore. Mersea Island has not been visited. I have found while working these marshes that the sheets of water lying behind the sea-wall are worthy of special attention. Of these the most profitable proved to be those at Ramsey Island, the old decoy at Goldhanger, and at the Old Hall marshes. Of the creeks Lawling, with its wide expanse of water, was the most fruitful and at all times interesting. The approach to this creek at Mundon Church, with the grand old trees in the adjoining park, constitutes a charming, hidden corner of the county. Visits to the estuary were made during all months of the year except May, June and July, which accounts for the absence of a number of species. One visit was made in December, 1921.

Dr. Eagle Clarke, in his "Studies in Bird Migration," vol. 1, p. 74, states that some of the summer visitors reach their accustomed nesting haunts by moving along the east coast, "the courses of rivers being largely used as highways to the interior." This may account for the presence of a number of warblers, some of them Willow Warblers, which were flushed from the low growth along the sea-wall, also several Redstarts, between Bradwell and Ramsey Island from 13th to 17th April, for these birds would certainly not remain in such exposed positions. It may be that the Blackwater is of some interest as a migration point, not only of arrival but also of departure, for the vast flock of Golden Plover observed here at this date was apparently about to start on its way northwards. Even to-day the estuary is not without occasional amazing concourses of birds.

It is perhaps worth mentioning that during the visit to Bradwell Tits were very scarce and not one was identified during the visit to Tollesbury.

Altogether 95 species were identified and these were to a considerable extent winter birds. I have mentioned every species identified, the status of those unaccompanied by data may be taken to be as usual.

Among the unidentified was a large raptorial, probably a Buzzard, which was being mobbed by Lapwings, to the south of St. Peters, and a Grebe, on to which Mr. Bayne got his glasses

may have been a Slavonian. A small Hawk seen on another occasion was almost certainly a Merlin.

Hooded Crow (*Corvus c. cornix* (L.)). Bradwell, one in a flock of Rooks, 15/4/22. Tollesbury, one with two Carrions, 14/10/22, and two 16/10/22.

Rook (*Corvus f. frugilegus* (L.)). Rookeries at Witham and Mundon and a small one beside St. Peters, Maldon.

Magpie (*Pica p. pica* (L.)). This species is well represented in the Dengie Hundred, but in the following records the same birds have probably been seen on different dates. Maldon, 22/1/22, 10/9/22. Mundon, four 5/2/22, 5/3/22, 10/9/22, 19/11/22, 4 and 11/2/23. Dengie, several 13/4/22. Bradwell, four 16/4/22, one 17/4/22, two 13/8/22. Steeple, three 17/4/22, 11/2/23. Langford, 22/10/22. Packards, 4/8/23.

Goldfinch (*Acanthis c. carduelis* (L.)). Four near Maldon, 27/12/21.

Tree Sparrow (*Passer m. montana* (L.)). Asheldam, 5/3/22. Mundon, two 19/11/22, about twenty 4/2/23, 11/2/23. There is a point of interest about the Mundon records, as on each occasion the birds were seen in the same hedge in very large flocks of Buntings and Finches. There must have been a good supply of food in the high and thick hedge to render the birds so stationary.

Corn-Bunting (*Emberiza c. calandra* (L.)). Bradwell, 19/3/22, 14/4/22. Ramsey Island 15/4/22. Steeple, 13/8/22. Mayland Creek, 11/2/23. The distribution of this Bunting in the county is interesting and requires further attention. While considering this it has to be kept in mind that in Britain the Corn-Bunting is chiefly found near the coast. Between the Thames and the Crouch this species is scarce and I have only identified it once in this area, but the Rev. A. Bertram Hutton, in his paper in the *Essex Review*, records a nest at Pitsea in June 1901. In my note on the Crouch I recorded one just north of Southminster and two were heard singing on the north bank of the Crouch, 6/8/23. The above records show that it is to be found along the southern shore of the Blackwater, but I have had to go north of the Colne to find this bird common.

Meadow-Pipit (*Anthus pratensis* (L.)). Rock-Pipit (*Anthus spinoletta petrosus* (Mont.)). Investigation is required as to what extent these species occur on our marshes in winter. There

can be no doubt that both occur, as I identified the Rock Pipit at Maldon 27/12/21 and at Tollesbury 14/10/22, but I am of opinion that the Meadow is much more abundant than the other Pipit.

Yellow Wagtail (*Motacilla flava rayi* (Bp.)). Well represented. First date 14/4/22, last date 10/9/22.

Willow-Wren (*Phylloscopus t. trochilus* (L.)). Heard singing among the warblers along the sea-wall, 14/4/22, probably just arrived.

Wheatear (*Oenanthe o. oenanthe* (L.)). Well represented. First date 14/4/22, last date 15/10/22.

Stonechat (*Saxicola torquata rubicola* (L.)). A very local species. Tollesbury 14 and 16/10/22 and Goldhanger 15/10/22.

Redstart (*Phoenicurus p. phoenicurus* (L.)). Several seen between St. Peter's and Ramsey Island from 14 to 17/4/22. No doubt these birds were newly arrived and would soon move off.

Swallow (*Hirundo r. rustica* (L.)). At no time numerous. First date 14/4/22, last date 14/10/22, when a single bird was seen at Tollesbury.

Martin (*Delichon u. urbica* (L.)). 13/8/22, 10/9/22 and 4/8/23.

Kingfisher (*Alcedo atthis ispida* (L.)). Identified on the estuary in Jan., Feb., Sept., Oct., Nov., and Dec.

Great Spotted Woodpecker (*Dryobates major anglicus* (Hart.)). In the copse near Mundon Church 22/10/22, 19/11/22 and 11/2/23.

Lesser Spotted Woodpecker (*Dryobates minor comminutus* (Hart.)). In the copse near Mundon Church 4/2/23.

Short-eared Owl (*Asio f. flammeus* (Pontopp.)). We had a first rate view of one on the sea-wall south of St. Peters 14/4/22. The owl came flying along the wall low down and straight towards us, when close to us the only alteration it made in its flight was to swerve outwards to the sea which improved our view.

Little Owl (*Athene noctua mira* (With.)). Identified at Maldon, Dengie, Bradwell, Goldhanger, Mundon and Steeple. We had an interesting experience with one of this species near Bradwell. We came upon this bird sitting in a tree a few feet above our heads and although we spent some time watching it the bird did not move.

Tawny Owl (*Strix aluco sylvatica* Shaw). Witham 27/12/21. Tollesbury, 14/10/22.

Barn Owl (*Tyto a. alba* (Scop.)). Bradwell, 14 and 16/4/22 ;

on both these days an owl, presumably the same bird, was seen hunting the slopes of the sea-wall with daylight at its height. It seemed almost regardless of our presence, in passing us it merely rose slightly in the air, on one occasion when it dropped to the ground it allowed us to walk within a few yards of it. Mundon, 22/10/22, one flew from one of the old trees near the church, screeching as it did so.

Peregrine (*Falco p. peregrinus* Tunst.). One observed on the Old Hall Marshes, 14/10/22. While I was watching this handsome bird through a high power telescope, from the top of the wall, I was disturbed by the keeper who, when I informed him that I was watching a Peregrine, replied that it was quite likely as this species occasionally frequented the marsh.

Sparrow-Hawk (*Accipiter n. nisus* (L.)). Globe Outfall, 5/8/23, one being chased by several Turtle Doves.

Grey Heron (*Ardea c. cinerea* L.). Observed on all visits, often in small parties.

Brent Goose (*Branta b. bernicla* (L.)). A party of 200 was observed off St. Peters, 16/4/22.

Shelduck (*Tadorna tadorna* (L.)). Occasional birds were observed in Jan., Feb., March, Aug., Oct. and Nov. During the visit to Bradwell from 13 to 17 April the Shelduck was really numerous, parties up to 21 being noted. Probably some of these birds were on migration.

Teal (*Anas c. crecca* L.). Ramsey Island, 13/8/22 ten. Gold-hanger, 15/10/22, party. Old Hall Marshes, 16/10/22, one or two parties.

Wigeon (*Anas penelope* L.). Old Hall Marshes, 14/10/22, twenty-five, 16/10/22, sixteen.

Pochard (*Nyroca f. ferina* (L.)). Ramsey Island, 17/4/22, two; 13/8/22, twelve.

Tufted Duck (*Nyroca fuligula* (L.)). Old Hall Marshes, 16/10/22, one.

Scaup Duck (*Nyroca m. marila* (L.)). Lawling Creek, 5/2/22, 6-8 male and female; 5/3/22, one female.

Goldeneye (*Bucephala c. clangula* (L.)). Mayland Creek, 11/2/23, a party of under a dozen with one or more mature males.

Velvet Scoter (*Oidemia f. fusca* (L.)). Several between Bradwell and St. Peters, 14 and 16/4/22. Lawling Creek, 19/11/22 one, 4/2/23 one or two.

Common Scoter (*Oidemia n. nigra* (L.)). Several between Bradwell and St. Peters, 14 and 16/4/22.

Red-breasted Merganser (*Mergus serrator* L.). Lawling Creek, 5/2/22, a badly oiled male picked up, skin now in my possession, 22/10/22 fourteen, 11/2/23 four females. Bradwell, 19/3/22 nine male and female, 14 and 15/4/22 parties of both sexes.

Cormorant (*Phalacrocorax c. carbo* (L.)). Single birds and small parties up to six seen in April, Aug. and Oct.

Great Crested Grebe (*Podiceps c. cristatus* (L.)). Bradwell Quay, 19/3/22 one, Bradwell 14 to 17/4/22 parties up to six seen each day. Lawling Creek, 22/10/22 one.

Red-necked Grebe (*Podiceps g. griseigena* (Bodd.)). Lawling Creek 5/3/22 one.

Black-necked Grebe (*Podiceps n. nigricollis* (Brehm.)). Bradwell to Ramsey Island, 14 and 15/4/22, several pairs were on this stretch of the river. Some of the Grebes were in their very handsome breeding plumage and once came close to the shore giving us remarkable views. (See *British Birds*, vol. 16, p. 26.)

Little Grebe (*Podiceps r. ruficollis* (Pall.)). Ramsey Island 15 and 17/4/22, 13/8/22. Old Hall Marshes, 14 and 16/10/22. Goldhanger, 15/10/22.

Red-throated Diver ? (*Colymbus stellatus* Pontopp.). Lawling Creek, one 22/1/22, 5/2/22 and 5/3/22. Osea Island, one 11/2/23. It is highly probable that these birds were Red and not Black-throated, although I never got sufficiently near to be certain.

Stock-Dove (*Columba o. oenas* L.). Mundon, 5/2/22 thirty, 5/3/22, 10/9/22 twenty, 22/10/22 three. It is not improbable that the old trees here may shelter a nesting colony. Bradwell, 19/3/22 a probable nesting place. Ramsey Island, 17/4/22.

Ringed Plover (*Charadrius h. hiaticula* L.). Identified in Jan., Feb., March, April, Aug. and Oct.

Golden Plover (*Charadrius apricarius* L.). Maldon, 22/1/22, some hundreds. This flock was unusually tame, the plover were spread over a field just inside the sea-wall and were separated from the observer by little more than the distance of the dyke. Lawling Creek, 5/2/22 many. On 14/4/22 Mr. Bayne and the writer had the good fortune to see a tremendous gathering of this species to the south of St. Peters. To estimate such a vast

flock of birds is impossible so that our figure of 10,000 must be taken as an index of the impression that was made on our minds at the time. So vast was this congregation that when it was first seen in the distance it did not occur to us that we were looking at birds but at a cloud or bank of mist. We marvelled at the homogeneous movements of this great mass of birds. At times parties would break away and sweep across the sea in a northerly direction as though on migration but these must have been trial trips as these detachments always returned to the main body. Maldon, 19/11/22 several with Lapwings. Mayland Creek, 4/2/23 large flock.

Grey Plover (*Squatarola s. squatarola* (L.)). Tollesbury, two small flocks on the mud, 14/10/22 fifteen, 16/10/22 seven.

Dunlin (*Calidris a. alpina* (L.)). Seen in parties of varying sizes, some containing hundreds, in Jan., Feb., March, April and Oct. It was noticeable that in April some individuals had partly assumed the breeding plumage, and that some still retained it at the beginning of August.

Green Sandpiper (*Tringa ochropus* L.). Globe Outfall, 5/8/23.

Common Sandpiper (*Tringa hypoleucos* L.). Ramsey Island, 13/8/22 three ; Lawling Creek, 10/9/22 one ; Globe Outfall 5/8/23 two.

Curlew (*Numenius a. arquata* (L.)). Abundant, seen on all visits.

Whimbrel (*Numenius p. phaeopus* (L.)). Near St. Peters, 16/4/22 one. Between Bradwell and Ramsey Island, 13/8/22 numerous. Bradwell, 4/8/23 numerous.

Snipe (*Capella g. gallinago* (L.)). Bradwell, 15/4/22 one. Mayland Creek, 22/10/22 one, 4/2/23 seventeen, 11/2/23 several.

Common Tern (*Sterna h. hirundo* L.). Several to the east of Bradwell, 5/8/23.

Little Tern (*Sterna a. albifrons* Pall.). One near Bradwell, 15/4/22 and one or two 5/8/23.

Great Black-backed Gull (*Larus marinus* L.). Occasional birds seen in April, Aug. and Oct. Unusually numerous at the beginning of August, 1923.

Herring Gull (*Larus a. argentatus* Pontopp.). Identified in Jan., Feb., Aug., Oct. and Dec. Always much less numerous than the Common or Black-headed.

Lesser Black-backed Gull (*Larus fuscus* L.). Occasional birds seen in Jan., April, Sept., Oct. and Dec. Unusually numerous at the beginning of August, 1923.

Common Gull (*Larus c. canus* L.). Identified in Jan., Feb., March, April, Aug., Sept., Oct. and Nov. and at times very numerous. A number feeding on the fields at Dengie 19/3/22.

Coot (*Fulica a. atra* L.). Lawling Creek, 22/1/22 a flock of 500. This is a reliable figure as the birds were filing along the edge of the creek in a thin line, rendering a count easy. The occurrence of Coots on the tidal water is unusual. I have only one other such record from this district ; probably this flock was migrating. A small party off Osea Island, 5/3/22. Ramsey Island, 15 and 17/4/22, young birds 13/8/22. Old Hall Marshes, 14 and 16/10/22 many.

Other species identified :—Carrion Crow (nest), Jackdaw, Jay, Starling, Greenfinch, Linnet, Bull finch, Chaffinch, House Sparrow, Yellowhammer, Reed Bunting, Skylark, Pied Wagtail, Tree-creeper, Great Tit, Blue Tit, Whitethroat, Fieldfare, Mistle-Thrush, Song Thrush, Redwing, Black-bird, Redbreast, Hedge Sparrow, Wren, Green Woodpecker, Kestrel (nest), Mallard, Wood Pigeon, Turtle Dove, Lapwing, Redshank, Black-headed Gull, Moorhen, Red-legged Partridge and Partridge.

History of the Ancient Parish Church of St. Andrew, Hornchurch, by CHAS. T. PERFECT. 1923. Benham and Company Limited, Colchester.

THIS little book, which is published at ninepence and the entire proceeds from the sale of which will be devoted to the restoration of the parish church, is full of good matter. The author's earlier works on Hornchurch are well known, and he is an authority on his subject. We cordially recommend the present modest volume, both because of its intrinsic worth and on account of the worthy purpose which inspires its publication.—ED.

ON A THIRD ANNOTATED COPY OF RICHARD WARNER'S "*PLANTAE WOODFORDIENSES*."

BY PERCY THOMPSON, F.L.S.

[Read 27th October, 1923.]

I HAVE on previous occasions¹ described two interleaved and annotated copies of Warner's *Plantae Woodfordienses* which came to my notice, and which proved to have been the work and property of, respectively, Benjamin Meggot Forster and Edward Forster, of Walthamstow, two of three brothers all of whom were interested, some century or more ago, in the local flora of the Epping Forest district.

A third annotated copy of Warner's book has since come into my hands, and this I propose to discuss with a view to determining the authorship of the notes written in manuscript on the interleaved blank pages.

The volume was noticed by me on the shelves of the valuable Library of the Saffron Walden Literary and Scientific Institution during the visit paid by the Club to that town at Easter, 1922; a cursory inspection suggested to me that a connection of the volume with the Forsters of Walthamstow was probable: and accordingly I asked and obtained permission to borrow the book and to investigate its history.

It is crown octavo, bound in whole buff leather, with tooled panels on sides and raised bands on back. The title on a black name-band (apparently not original) is anglicised into WARNER'S PLANTS OF WOODFORD, while the original red date-band is lettered "LOND. 1771."

The volume contains the "Appendix," the "Index of the English Names," and the "Errata," but not the "Index of the Latin Names" nor the "Additions" of 1784; it is, therefore, certainly the original edition of 1771, as indicated by the date on the binding.

The interleaved blank pages of handmade paper bear occasional fragments of a water mark which appears to be capable of reconstruction into a conventional fleur-de-lys bound by a triple band: the printed pages show no water mark.

¹ ESSEX NATURALIST, XIX., p. 72 *et seq.*; *ibid.*, p. 221 *et seq.*

The manuscript annotations are twenty-four in number, and read as follows :—

ALLIUM sylvestre latifolium *Ra. Syn.* 370.

ALLIUM (*ursinum*) scapo nudo semicylindrico, foliis lanceolatis petiolatis umbella fastigiata. *Hud. Fl.* 122.

Classis Linnæi Hexandria Monogynia.

Ramsons.

In woods and hedges. Found in the lane from Chapel End to Chingford and on the Hawks Eye in plenty.

It flowers in May.

ALSINE vulgaris, seu morsus gallinæ *Raii Syn.* 347.

ALSINE (*media*) petalis bipartitis foliis ovato cordatis. *Hud. Fl.* 113.

Classis Linnæi. Pentandria Trigynia.

Common Chickweed.

In cultivated places, very common.

It flowers from April to September.

BLITUM foetidum, vulvaria dictum. *R.S.* 156.

CHENOPODIUM (*vulvaria*) foliis rhombeo-ovatis integerrimis, floribus glomeratis. *Hudsoni Fl.* 92.

Classis Linnæi Pentandria Digynia.

Stinking Orache.

On rubbish common.

It flowers in August.

CALAMINTHA odore pulegii *Raii Syn.* 243.

MELISSA (*nepeta*) pedunculis axillaribus dichotomis folio longioribus caule decumbente *Hudsoni Fl.* 230

Classis Linnæi Didynamia Gymnospermia.

Field Calamint.

By waysides. Found under the garden wall of the manor house in Sernal Street and in the lane leading from Whips cross to Hoe Street, Walthamstow.

It flowers in August.

ERUCA sylvestris *Raii Syn.* 296.

BRASSICA (*erucastrum*) foliis dentato-pinnatifidis, caule hispido, siliquis lævibus *Hudsoni Fl.* 253.—*muralis* 2^d. Ed.

Classis Linnæi Tetradynamia Siliquosa.

Wild Rocket.

At Waltham Abbey.

It flowers in May or June.

FILIX mas non ramosa, pinnulis angustis raris, profunde dentatis *Raii Syn.* 121.

POLYPODIUM (*filix fœmina*) fronde bipinnata: pinnulis lanceolatis pinnatifidis acutis, *Hudsoni Fl.* 389.

Classis Linnæi Cryptogamia: Filices.

Male Fern, with thin set deeply indented leaves.

In shady places. Found among the bushes on the E. side of Snarebrook pond. uncommon.

FILIX saxatilis, caule tenui fragili. *R. Syn.* 123.

POLYPODIUM (*fragile*) fronde bipinnata : foliolis remotis pinnis subrotundis incis. *Hudsoni Fl.* 390.

Classis Linnæi Cryptogamia : Filices.

Fine-cut Stone Fern, with slender and brittle stalks.

Found on a wall in the lane leading from the Lea Bridge road to Leyton Church : very uncommon.

FUMARIA alba latifolia. *Raii Syn.* 335.

FUMARIA (*claviculata*) siliquis linearibus foliis cirriferis. *Hudsoni Fl.* 270.

Classis Linnæi. Diadelphia Hexandria.

Climbing Fumitory.

In moist woods and hedges. Found in little Shrub-bush in plenty, and among the bushes on the E. side of Snaresbrook pond. uncommon.

It flowers in June.

HIERACIUM fruticosum angustifolium majus. *Raii Syn.* 168.

HIERACIUM (*umbellatum*) foliis linearibus, subdenticulatis sparsis, floribus subumbellatis *Hudsoni Fl.* 300.

Classis Linnæi, Syngenesia Polygamia Æqualis.

Narrow leaved bushy Hawkweed.

Found on the Forest, near the S. side of Snaresbrook pond. very uncommon.

It flowers in July or August.

HIERACIUM minimum clusii. Hyoseris Tabernæmontani et Gerardi.

Raii Syn. 173.

HYOSERIS (*minima*) caule diviso nudo. *Hudsoni Fl.* 302.

Classis Linnæi Syngenesia : Polygamia Æqualis.

Small Swines Succory or Hawkweed.

Found in Marks house, Broomfield and Higham hill common fields Walthamstow. uncommon.

It flowers in May or June.

HOTTONIA *Raii Syn.* ; 285.

HOTTONIA (*palustris*) pedunculis verticillato-multifloris. *Hudsoni Fl.* 72.

Classis Linnæi. Pentandria Monogynia.

Water Violet.

In ditches and gravel pits. Found in the marsh ditches near the Lea, and in gravel pits near Woodford Mill. common.

It flowers in July or August.

MOSCHATELLINA foliis fumariæ bulbosæ *Raii Syn.* 267.

ADOXA (*moschatellina*) *Hudsoni Fl.* 150

Classis Linnæi. Octandria Tetragynia.

Tuberous Moschatel. Muskwood Crowfoot.

In shady places. Found under hedges in a field leading from Wood Street to Chapel End Walthamstow in plenty. uncommon.

It flowers in March or April.

NIDUS avis. *Raii Syn.* 382.

OPHRYS (*nidus avis*) bulbis fibroso fasciculatis, caule vaginato, nectarii labio bifido. *Hudsoni Fl.* 338.

Classis Linnæi Gynandria Diandria

Mishapen Orchis or Birdsnest.

WOODFORDIENSES. 105

NASTURium spinum capitulis verrucosis: five
Coronopus Ruellii. *Rail Syn.* 304.

COCHLEARIA [*Coronopus*] foliis pinnatifidis.
Hudsoni Fl. 248.

Clethra Linnei: Tetradynamia Siliculosa.
Swine's Cresses.

In moist places; on the sides of roads and
paths. Found near a pond almost opposite the
nine mile stone Woodford Row; and on the side
of the road to Woodford Bridge, near the eight
mile stone: not very common.

It flowers in June, July, or August.

NEPETA maior vulgaris. *Rail Syn.* 237.

LYSIPHYLLA [Catania] floribus spicatis verticillatis
subpedicellatis, foliis petiolatis cordatis den-
tato serratis. *Hudsoni Fl.* 220.

Clethra Linnei: Didynamia Gymnospermia.

Net, Nap, or Cat-mint.

In fields, and under hedges. Found near
Abridge: not very common.

It flowers in July.

NUMMULARIA. *Rail Syn.* 383.

LYSIMACHIA [Nummularia] foliis ovatis acutis,
floribus foliatis, caule procumbente. *Hud-
soni Fl.* 73.

Clethra Linnei: Pentandria Monogynia.

Money-wort, or Herb Two-pence.

In fields, and moist places near ditches. Found
in Mr. Warner's large field, in plenty: not un-
common.

It flowers in June.

N.C.M.

P

Androsace Linnei: *Syn.* 382

Androsace (Linnei: *Syn.*) *Androsace* sp. *Androsace*

the caule vaginato, nectarii latic bipido.

Hudsoni Fl. 338

Androsace Linnei: *Syn.* *Androsace*

Androsace Linnei: *Syn.* *Androsace*

Friend once 28 May 1775 near the South

gate of the castle, not far from the Royal

Oak at Hale End very uncommon.

It flowers in May.

* "Sale" - a wood of small extent at Hale End

the "Sale" - a wood of small extent at Hale End

still known 1840 by that name.

M.P.

Found once 28 May 1778 near the South gate of the Sale, not far from the Royal Oak at Hale End very uncommon.

It flowers in May.

RANUNCULUS rectus, foliis pallidioribus hirsutis *Raii Syn.* 247.

RANUNCULUS (*bulbosus* β) calycibus retroflexis, pedunculis sulcatis, caule erecto, foliis compositis. *Hudsoni Fl.* 211.

Classis Linnæi Polyandria Polygynia.

Upright pale leaved Crowfoot.

In meadows. It flowers in May.

RANUNCULUS hirsutus annuus flore minimo *Raii Syn.* 248.

RANUNCULUS (*parviflorus*) seminibus muricatis, foliis simplicibus laciniatis acutis hirsutis, caule prostrato. *Hud ; Fl.* 212.

Classis Linnæi Polyandria Polygynia.

Field Crowfoot, with a very small flower.

Found in the lane leading from Clay street to Higham hill field on a bank, and under the wall of the manor house Shernal Street, Walthamstow.

It flowers in May.

RANUNCULUS scabiosæ capitulo cæruleo *Raii Syn.* 278.

JASIONE (*montana*) *Hudsoni Fl.* 329.

Classis Linnæi. Syngenesia Monogamia.

Hairy Sheep Scabious.

In Higham hill common field.

It flowers in June or July.

SAMOLUS valerandi *Raii Syn.* 283

SAMOLUS (*valerandi*) *Hudsoni Fl.* 179

Classis Linnæi. Pentandria Monogynia.

Round leaved Water Pimpernel.

On the bank of the Rodon almost opposite the 8 mile stone in the Woodford bridge Road, very uncommon.

It flowers in June.

SEDUM minus teretifolium album *Raii Syn.* 271.

SEDUM (*album*) foliis oblongis obtusis teretiusculis sessilibus patentibus, cyma ramosa. *Hudsoni Fl.* 171

Classis Linnæi Decandria Pentagynia.

White flowered Stonecrop.

Found on a wall at Barking, and at Plaistow uncommon.

It flowers in June or July.

SIUM arvense sive segetum *Raii Syn.* 211.

SISON (*segetum*) foliis pinnatis, umbellis cernuis *Hudsoni Fl.* 104.

Classis Linnæi Pentandria Digynia.

Corn Parsley or Honewort.

Found on a bank in Hagger lane, the corner of Hale End lane.

It flowers in July.

STRATIOTES foliis asari, semine rotundo *Raii Syn.* 290.

HYDROCHARIS (*morsus ranæ*) *Huds. Fl.* 372

Classis Linnæi Dioecia Enneandria.

Frog bit.

In the marsh ditches near the river Lea. common.

It flowers in June.

TRIFOLIUM pumilum supinum flosculis longis albis. *Raii Syn.* 327

TRIFOLIUM (*subterraneum*) capitulis villosis subquinquefloris, involucro centrali reflexo rigido, fructum involvente *Huds. Fl.* 286.

Classis Linnæi Diadelphia Decandria.

Dwarf Trefoil.

Found in Wansted Park, near the garden gate plentifully.

It flowers in May.

TURRITIS vulgaris ramosa *Raii Syn.* 294.

ARABIS (*thaliana*) foliis petiolatis lanceolatis integerrimis *Hudsoni Fl.* 254.

Classis Linnæi Tetradynamia Siliquosa.

Codded Mouse Ear.

On walls, roofs, and in dry fields common.

It flowers in May.

TYPHA palustris media *Raii Syn.* 436.

TYPHA (*angustifolia*) foliis semicylindricis spica mascula feminiæque remotis *Hudsoni Fl.* 345.

Classis Linnæi. Monoecia Triandria.

Narrow leaved Cat's Tail.

Found on a bog in the woods near Salter's Buildings in plenty.

It flowers in July.

VICIA *Raii Syn.* 320.

VICIA (*sativa*) leguminibus sessilibus subbinatis erectis, foliolis retusis, stipulis notatis *Hudsoni Fl.* 278.

Classis Linnæi Diadelphia Decandria.

Common Vetch or Tare.

In fields among corn and in hedges common.

It flowers in May and June.

A slip pasted in the fly-leaf bears a MS. note as follows :—
 “ In this copy is found I think the very earliest record (here in MS.) of the *Cytopteris* [*sic*] *regia* as growing upon that well-known wall near Leyton. mem. the approximate date of these MS. Notes may I think be fixed by that at p. 105 (*Listera nidus avis*) where we find May 28 1778 as the the [*sic*] day on which this rare plant was observed by the writer ” ; and on the interleaf facing page 105 the manuscript annotation which records *Ophrys nidus avis* (given above) has a gloss running thus, “ the ‘ Sale ’—a wood of small extent at Hale End still known 1840 by that name. W.P.” The writer of both these notes is quite certainly William Pamplin, the botanist-publisher of 45 Frith Street, Soho Square, who published Gibson's *Flora of Essex* in 1862 ; comparison of known examples of Pamplin's caligraphy with the present volume leaves no doubt on the point.

Comparison of the MS. annotations with the printed “ Additions ” of 1784 shows that there exists an almost complete identity between the two lists of plants ; all the new records

London 28 June 1790

Dear Sir

I was informed yesterday at
 Chancery that the Ship with your papers was arrived &
 that they were in the Kings Warehouse, where they will
 remain until they are entered. I would have entered
 them immediately if I had known that I am you
 would choose me to value them at as they pay duty
 according to their value, if you will let me know as
 soon as you conveniently can I will enter them &
 send them to Northampton or if you think it best keep
 them here until you return

John Lister is set out on his journey to ~~Leam~~ Leam
 before he went, he informed me that you had been so
 good as to promise him a letter ~~from~~ to Mr. Stuart &
 desired me to beg the favour of you if you had no objection
 to trouble yourself to send it to me that I might forward
 it to him at Corkish where he will be the beginning of
 next month which if you really have no objection to do
 you will oblige me very much. Since you left London
 I have received a parcel of Plants from Swell. he
 says that we must send any parcel that we have for him
 before the 15th of July to Mr. Mandrot of New Chiswick
 Street I shall be particularly obliged to you if you
 can with convenience procure one for Swell some
 Specimens of *Smyrnium Olusatrum* & send them
~~to me~~
 before the 10th of July I would not trouble you if I knew
 where to find them near London ^{Yours aff. friend}
J. J. 701. August

given in the annotations are reproduced in Thomas Furly Forster's printed list of 1784 without a single exception, the habitats given are identical, and the descriptions of the several plants are similarly, indeed almost identically, worded.

This can scarcely be mere coincidence. There can be no reasonable doubt that the "Additions" published in 1784 are copied, with a few emendations, from these manuscript notes.

Six plants, not mentioned in the annotations, appear in the printed list of 1784, viz. :—*Chara vulgaris*, *Chenopodium viride*, *Mentha gentilis*, *Salix triandria*, *Salix helix* and *Salix vitellina* ; we may infer that in the interval between 1778 (the presumed date of the notes) and 1784, additional records were made and the difficult genus *Salix* was being tackled by the recorder.

This almost perfect identity implies that the annotated volume now described contains Thomas Furly Forster's own manuscript records of his additions to Warner's list of plants, which afterwards, in 1784, he printed under the title of "Additions to Warner's Plantæ Woodfordienses."

A comparison of the handwriting of the MS. notes with the known caligraphy of Edward and Benjamin Forster, while presenting many resemblances (as might be expected in the case of three brothers, all of about an age and who were probably educated together) yet exhibits sufficient variations to justify the conclusion that it is distinct from either ; and actual comparison of the manuscript with letters written by Thomas Furly Forster, in the possession of the Linnean Society (which I have had the privilege of inspecting by favour of Dr. B. Daydon Jackson), and also with his signature to the register of St. Mary's Church, Walthamstow, on the occasion of his marriage, goes to prove that these manuscript annotations were in fact written by Thomas Furly Forster himself. The earliest dated letter of Thomas Furly Forster's which the Linnean Society possesses is one addressed to "Dr. Smith at Mr. Smith's Norwich," dated 28 June, 1790.² This letter is 12 years later than the date of the MS. annotations and, bearing this interval of time in mind, I can have no hesitation in regarding the latter as being in the same handwriting. When the annotations were written T. F. Forster was only 17 years old, and at this age one's handwriting is scarcely fixed, as is indeed evident from

² This I am permitted by the Council of the Society to reproduce in *facsimile*.

the letters bearing later dates in the Society's collection which, although written and signed by T. F. Forster, yet show marked deterioration in caligraphy from his more youthful script.

One of the six extra plants given above, *Mentha gentilis*, is recorded as having been found "by the side of a mill stream in Mr. Thomas Williams's grounds, the Grove at Westham." Now Thomas Williams was father of the lady (Susanna Williams), whom T. F. Forster married in 1788, and one is tempted to surmise that the latter's no doubt frequent visits to Stratford just before that interesting time approximately date the finding of this Mint as being only very shortly before the actual publication of the "Additions" in 1784.

We may note also that G. S. Gibson, in his "Flora of Essex," 1862, credits Thomas Furlly Forster with being the first recorded discoverer of *Ranunculus parviflorus*, *Corydalis claviculata*, *Sedum album* (with a note of interrogation), *Ophrys apifera* and *Cystopteris alpina*, all in 1778. In recording *Cystopteris alpina* he says: "A MS. note, apparently written by T. F. Forster, about 1778, in the *Plantæ Woodfordienses*, is the earliest known notice of it." This statement suggests that Gibson must have seen, or actually had in his possession, the annotated copy of Warner's book now under discussion.

I suggest that Gibson came into possession of this, T. F. Forster's own annotated copy of the "*Plantæ*," probably by gift or purchase from Pamplin, and that he made use of it in connection with the preparation of his "Flora of Essex"; hence his knowledge of the earliest local records of the several plants mentioned and of the date of such records.

Since the above was written, confirmation of the suggestion made has unexpectedly come to hand. In a MS. biography of Richard Warner, written by the late Professor G. S. Boulger, and presented to the Club by his executor, reference is made to a copy of the *Plantæ* "that apparently belonged originally to Thomas Furlly Forster and subsequently to Mr. Pamplin and to the late G. S. Gibson, Esq., author of the 'Flora of Essex.'" There can be little doubt that the copy mentioned by Prof. Boulger is identifiable with the volume now being described.

Each interleaved blank page which happens to bear an annotation has had the top corner carefully turned down to mark it;

this may well have been done by Gibson when referring to the notes in preparing his "Flora."

Gibson probably presented this copy of the "Plantæ Woodfordienses" to the Saffron Walden library, as one of the many scientific volumes which he donated to that Library: it is unfortunate that, as I am informed by Mr. A. E. Gower, the librarian, no record of the provenance of this particular volume exists to confirm this.

This third annotated copy of Warner's Woodford Flora, though of less value as regards its records, whether considered from a botanical or from a topographical point of view, than are the two previously described copies, is yet of interest in that it confirms the late Professor Boulger's shrewd suspicion that each of the three brothers Forster possessed his own interleaved copy of the "Plantæ" in which he was accustomed to enter his own new finds. It may be useful here to record the present disposition of each of the three copies, viz. :—

1. Thomas Furly Forster's copy, in the Library of the Literary and Scientific Institution at Saffron Walden ;
2. Benjamin Meggot Forster's copy, hitherto belonging to our member, Mr. J. J. Holdsworth, but now in the Club's possession, it having most kindly been presented to the Library by Mr. Holdsworth ; and
3. Edward Forster's copy, in the possession of our honorary member, Dr. B. Daydon Jackson.

Gibson remarks that T. F. Forster "does not appear to have paid any special attention to the botany of Essex." Certainly, after publication of his "Additions to Warner's Plantæ Woodfordienses" in 1784, it would seem that he transferred his attention elsewhere. In 1788 he married, and afterwards went to live in Clapton, not returning to Walthamstow as a resident until 1823, two years before his death. His business affairs in the City were probably exigent in their demands upon his time. He was partner with his father in the firm of Edward Forster and Son, merchants, of 38, Threadneedle Street (afterwards of 6, Saint Helen's Place), and he followed in his father's footsteps by becoming, by 1804 or earlier,³ a member of the Court of Assistants of the Russia Company, and, by 1813,⁴ a director

³ Kent's *Directory*, 1804, *ibid.*, 1808.

⁴ *Post Office Annual Directory*, 1813, *ibid.*, 1817.

of the Royal Exchange Assurance, of each of which large concerns his father was Governor for so many years.⁵ He was elected F.L.S. in 1800. In 1816 he published his "Flora Tonbrigensis," having, as he says in his Preface to that book, "paid particular attention to the climate, to the variation in the soil, and to the natural productions of this part of England"; but he seems never to have returned to any active participation in his two brothers' records of the local Walthamstow or Essex plants.

THE ESSEX FIELD CLUB—REPORTS OF MEETINGS.

VISIT TO WARLEY PLACE, GREAT WARLEY (563RD MEETING).

SATURDAY, 28TH APRIL, 1923.

The full complement of 35 invited Members paid a fifth visit to our Member, Miss E. Willmott's, celebrated garden at Warley Place in delightful weather on the above afternoon. Assembling at Brentwood station at 2.11 o'clock, the party walked to Warley and was welcomed by our hostess at shortly before 3 o'clock.

The garden was in its full vernal beauty, and attracted great admiration on the part of the visitors. Where all things were lovely it seems invidious to select any for special notice, but the glorious Spetchley Primroses, patches of which, of all shades, were seen at their best, cannot be passed over, seeing that they are a special outcome of Essex floricultural art and patience. *Erodium romanum*, so named from its habitat on the walls of the Coliseum at Rome, and scattered specimens in the grass of the beautiful little *Narcissus triandrus*, were other outstanding delights. The rock gorge, with its trickling streamlet, which forms so charming a feature, was gay with rock and water plants. *Lathræa clandestina*, the beautiful-flowered root-parasite, was seen forming large masses of lilac flowers at the foot of a poplar.

Tea was taken in the garden-room at 5 o'clock. After tea, by our hostess' kind permission, a short meeting of the Club was held, with our Vice-President, Mr. R. Paulson, F.L.S., in the chair, when nominations of two candidates for membership were read.

The Hon. Secretary apologised for the unavoidable absence of our new President, Dr. Smith Woodward, who was detained on official business at the Natural History Museum.

He called attention to the impending demolition of the old Elizabethan Court House at Barking, which had been ordered by the District Council, and gave notice of a special meeting of the Club to be held for the purpose of inspecting the Court House and to protest against its demolition, on the following Saturday.

⁵ A portrait of Edward Forster, senr., Governor of the Royal Exchange Assurance, engraved by Chas. Turner, after a painting by J. J. Hoppner, R.A., is in the collection of the Guildhall Library, London. It was published March 24, 1810, 130 years before his death.

The Chairman proposed the hearty thanks of the party to our hostess for her kindly hospitality, and these were accorded with acclamation. Miss Willmott expressed her thanks, and, at her suggestion, some further time was spent in inspection of the garden.

The party later returned to Brentwood, where the 7.41 o'clock train to London was caught.

INSPECTION OF THE OLD COURT HOUSE AT BARKING AND MEETING OF PROTEST (564TH MEETING).

SATURDAY, 5TH MAY, 1923.

Information having been received that the Barking Council had given instructions that the old Court House should be pulled down forthwith, a Special Meeting of the Club was called, at a few days' notice, for the purpose of inspecting the building and of voicing a protest against that Council's action: some 24 Members answered the summons.

The Meeting, at which representatives of various other Societies interested in the preservation of ancient buildings were present by invitation, was held at 3.15 o'clock in one of the upper rooms of the Court House, the President, Dr. A. Smith Woodward, F.R.S., etc., presiding.

The Hon. Secretary explained the object of the Meeting and read letters he had received from the Barking Council, and from various leading archaeological and antiquarian societies and others, on the subject of the proposed demolition. He gave a brief sketch of the history of the building, which was erected in 1567 to serve as a Court House for the Manor of Barking, then held by the Crown.

Our Member, Mr. C. Dawson, who is Surveyor to the Council, exhibited a measured drawing of the building, made by his son, showing it in its original condition, the restoration being based chiefly on evidence which came to light in about 1893 during partial stripping of the lath and plaster casing. Mr. Dawson gave it as his definite opinion that the structure was quite capable of being repaired.

Mr. J. Frederick Green, representing the Society for the Protection of Ancient Buildings, and Mr. Colin Reader, representing the British Archaeological Association, spoke of the attempts already made to raise a Fund for repair or restoration of the Court House, and urged that a further attempt should be made to secure public support.

After Mr. Brand and others had spoken, a Resolution was proposed by Mr. Colin Reader and seconded by Mr. Green in the following terms:—

"That this Meeting of the Essex Field Club, together with representatives of the Essex Archaeological Society, the Society for the Protection of Ancient Buildings, the British Archaeological Association, and the Gilbert White Fellowship, records its protest against the proposal of the Barking Urban District Council to demolish the old Court House, and respectfully urges the Council to reconsider its decision for immediate demolition, and asks it to grant a delay of six months in the expectation of further funds becoming available for repair."

The Resolution, on being put to the meeting, was carried unanimously.

The meeting then adjourned for the purpose of making a detailed inspection of the interior and exterior of the building, under the guidance of Mr. C. Dawson.

VISIT TO THE VANGE MINERAL WELLS (565TH MEETING).

SATURDAY, 12TH MAY, 1923.

A day of cold sweeping winds and thunder showers, but with many brilliant sunny intervals, did not deter a small but representative party of members from making a pilgrimage to Vange for the inspection of the mineral wells on the Vange Corner estate, the water from which has lately come into commercial prominence as being of medicinal virtue. Our members, Dr. John C. Thresh, M.D., D.Sc., and Mr. W. Whitaker, B.A., F.R.S., acted as expert conductors to the party.

On arrival at Pitsea station at 10.36 o'clock, the parish church of St. Michael, picturesquely perched on an isolated, rounded hill of London Clay and surrounded by tall elms, was first visited: the church itself is uninteresting, being of modern rebuilding except the square ragstone tower, but the extensive view from it over the surrounding country, and especially southwards over the marshland and Canvey Island to the Thames estuary and the Kentish hills, was much enjoyed.

Proceeding to Vange church, which occupies a similar commanding hill-top site, the visitors were welcomed by the rector, the Rev. St. John Methuen, who read an account of the ancient fabric, which still retains some Norman features, including a square Purbeck marble font, and who exhibited the Registers, going back to 1558.

At the Wells, which were reached soon after 1 o'clock, the owner, Mr. Edwin Cash, most hospitably welcomed the party to a sandwich-lunch which he had thoughtfully provided. Dr. Thresh tested various samples of the water for solid constituents and gave some particulars of the water. He remarked that sulphated waters are common; the Vange water, however, contained in addition to the usual sulphate of lime (which frequently occurred in Essex waters), sulphates of magnesia, soda and potash which made it typical of the best class of sulphated waters, and rendered it beneficial as a mild aperient and also in having a mild effect upon the liver.

Mr. Whitaker briefly described the geological conditions under which the Vange springs occurred. He referred to the loamy Claygate Beds which capped the higher ground, through which rain sinks slowly, dissolving in its passage whatever salts may be present in the soil, until it is arrested or thrown out by the stiffer beds of the true London Clay beneath.

Mr. Cash gave an account of his first discovery of this sulphated water, over twenty years ago, and of its recent exploitation for commercial use. He said that his dream was to establish a poor man's spa at Vange, his principal object being the good of suffering humanity.

An inspection of two of the six wells was then made by the visitors, and samples of the water were tasted: the taste was voted to be not unpleasant, the presence of soda being the most apparent characteristic to the palate and the water being quite limpid and colourless. The first well sunk was only

some 14 feet deep, but the later ones are deeper, No. 5 well being 42 feet, and No. 6 well 24 feet in depth. Curiously enough, although the water is advertised as "Vange Water," the wells, which are situated along the eastern edge of Martinhole Wood, are actually in the parish of Fobbing, as are also other wells sunk by rival exploiters, whose water, however, is of less medicinal value. An account of the Vange water, its constituents and its mode of occurrence, by our Conductors, was given in this Journal (*ante*, pp. 221-227).

A visit was next paid to the Vange Pumping Station of the Southend Waterworks Co., where the party was welcomed by the Chairman of the Company, Mr. J. Francis, and by the secretary and manager, Mr. C. S. Bilham, and his son, the engineer to the company. Samples of rock met with in the various wells sunk by the Company in south-east Essex, and shells, sharks' teeth, etc., from the London Clay, were exhibited and diagram-sections of the deep borings at Vange, Leighbeck, and elsewhere, were shown. An inspection was also made of the large covered Reservoir, containing some nine million gallons of water from the deep local boring, and of the engine-house.

Returning to the Mineral Wells, the company was entertained to tea by Mr. Cash and his family, following which a formal Meeting of the Club was held, the President, Dr. A. Smith Woodward, presiding.

Mr. Frank W. Jane, of 163, *East Barnet Road, New Barnet, Herts*; and

Mr. St. John Marriott, of 37, *Owenite Street, Abbey Wood, S.E.2*, were elected Members, and one certificate of nomination for membership was read.

The President proposed the warm thanks of the party to our Conductors, and to the Chairman, Manager and Engineer of the Southend Waterworks Co., and also to Mr. Cash and his family, for their abundant hospitality; these were heartily accorded.

The return walk to Pitsea enabled the somewhat tired visitors to catch, with not a minute to spare, the 6.46 up train to London.

Thousands of Green-winged Orchis (*O. morio*) covered the fields about the Wells of Vange, and the Cotton Thistle (*Onopordon acanthium*) was noticed growing on the hill by Pitsea church. Adder's-tongue Fern (*Ophioglossum vulgatum*) was found at Vange.

Ornithologists of the party reported the discovery of a nest of Great Crested Grebe containing three eggs, a Magpie's nest and others, while the song of the Nightingale was insistent in the wood at Vange.

VISIT TO MALDON AND BEELEIGH ABBEY (566TH MEETING).

SATURDAY, 2ND JUNE, 1923.

In response to a kind invitation from Mr. and Mrs. R. E. Thomas, the owners and occupiers of the restored Beeleigh Abbey, a meeting was arranged at Maldon, in order to take advantage of this welcome offer to inspect this architecturally interesting medieval building.

The London party travelled by train leaving Liverpool Street at 11.30 o'clock, and reached Maldon East station, rather belated, shortly after 1

o'clock, where some country members joined, as also did our host, Mr. R. E. Thomas.

Lunch—a first desideratum in view of the hour—was taken at the Blue Boar Hotel, after which an inspection was made of this picturesque inn, which includes some late 14th century and later timber work.

At All Saints' Church the visitors were met by the vicar, the Rev. I. L. Seymour, M.A., Rural Dean, who gave an interesting account of the fabric and its monuments, and who mentioned that the great grandfather of George Washington was buried in the churchyard in 1652, as recorded in the church register. The unique triangular Tower of Transitional Norman date, the richly canopied wall arcade and sedilia in the south aisle of the nave, and the beautiful whorl-tracery of the Decorated east windows of the same aisle, were in turn admired. Mr. Seymour also kindly threw open the delightful half-timbered Vicarage, built at the close of the 13th century, and carefully restored in 1902, to the visitors' inspection.

The party then proceeded to the Plume Library, bequeathed to his native town and endowed by Dr. Thomas Plume, DD. (1630–1704), which is housed in a brick building, erected by the donor on the site of the destroyed St. Peter's Church, and is approached through the still standing original Tower. Some 6,000 volumes are now comprised in this Library, which is in the charge of Mr. Seymour, as Librarian. Among the treasures shown to the visitors were first editions of Milton's "Paradise Lost" (1667) and "Paradise Regained" (1671), now worth £300 each, and a black-letter edition of Chaucer (1561). An oil-portrait of Archbishop Laud, an early copy of the original in St. John's College, Cambridge, hangs on the walls.

Passing through the town and along a field path which gave charming views over the Blackwater valley, Beeleigh Abbey was reached soon after 3 o'clock; here the party was received by Mrs. Thomas in the vaulted Calefactory or Warming House of the former abbey, and here our host gave an interesting account to the visitors of the history of the building in which they were.

Beeleigh Abbey was founded in 1180 by one Robert Mantell, lord of the manor of Little Maldon, as a house of the Order of Premonstratensians, or White Canons, on their removal from Great Parndon, at the other end of the County, where they had an earlier settlement, which is still kept in memory by the name of certain lands, "Canons," there. Mr. Thomas remarked that the Warming House or Common Room, in which the party was assembled, was the earliest monastic room in England which is still used as a dwelling: it was built in A.D. 1225, and formed an undercroft to the Dorter. The latter apartment, with its fine open waggon roof, the picturesque 16th century half-timbered addition to the buildings, and the beautiful vaulted Chapter House (*circa* 1225) were in turn inspected.

Tea, which was served in the Chapter House, was a distinctly monastic function, the guests being seated on benches and chests flanking long tables, whilst our hostess meanwhile improvised for our pleasure on an old sweet-toned organ, believed to have been played upon by the great Handel himself.

After tea, a formal Meeting of the Club was held, with the President in the Chair, when, after adequate discussion, the following Resolutions were passed unanimously:—

"That in the opinion of this Club the Reservoirs in the Lea Valley

should be regarded as a nature reserve, and that the Metropolitan Water Board should be respectfully urged to order the discontinuance of the practice of shooting wild birds on its property."

"That the London County Council be earnestly appealed to to take such action as will ensure that the ancient Court House at Barking shall be maintained on its present site."

The President then moved that the cordial thanks of those present be accorded to the Rev. I. L. Seymour for his kind conductorship at Maldon, and to our host and hostess, Mr. and Mrs. R. B. Thomas, for their kindly hospitality at their home. The proposal was carried with acclamation.

Mr. Seymour and Mr. Thomas in turn responded, and the Meeting adjourned.

Some time was spent, under the conduct of our host, in making a tour of the gardens. At half-past six leaves were taken, and the visitors walked back to Maldon, where the 7.22 o'clock train to town was caught and a most enjoyable excursion brought to a close.

FIELD MEETING AT ROYDON AND PARNDON (567TH MEETING).

SATURDAY, 23RD JUNE, 1923.

A day of mild regrets! Regrets on the part of those members who, daunted by the long continuance of cold, dull weather, did not send in their names to join this field-meeting, and, in lesser degree, regrets of those who, having joined, had to endure the fatigues of an eight-mile cross-country walk, partly by way of ploughed land, and in the broiling heat of an unanticipated hot, cloudless day, with little breeze and the thermometer at 75! Yet it is doubtful if a single person of the little band of 17 who made up the party would have missed the joy of seeing, and being in, the charming Essex country, bathed in sunlight as it was, to avoid the minor discomforts of the sudden heat.

The main object of the meeting was a botanical one, it being desired to collect and record plants in the more northerly portion of the "Forest district" with a view to the revised list of plants which a Committee of the Club is compiling. Our member, Mr. Geoffrey Dent, acted as topographical guide throughout the day.

Setting out from Roydon station at shortly after 12 o'clock, the route was along the footpath skirting the river Stort on its Essex bank until near its junction with the Lea, *Thalictrum flavum*, *Valeriana dioica*, *Mimulus luteus*, *Eupatorium cannabinum*, *Lychnis flos-cuculi* and *Iris pseudacorus* being noted by the way. Thence the party struck inland to Nether Hall, the picturesque ruins of which 15th century fortified manor-house, with gatehouse and encircling moat, were thrown open to the party by courtesy of the owner, Mr. Walton; who also kindly showed the visitors one of his barns, a magnificent interior with a vista of curved oak roof-timbers like a church.

From Nether Hall, a cross-country field walk was entered upon towards Great Parndon, collections of flowering plants being assiduously made *en route*. On the higher ground, where Chalky Boulder Clay overlies the London

Clay, plants of Chalk *facies* were sought, but, owing presumably to the unseasonably cold weather of the year, results were disappointing. A few Bee Orchis (*Ophrys apifera*), *Orchis maculata*, *Chlora perfoliata*, *Linum catharticum*, *Viburnum lantana* and *Clematis vitalba* were, however, noted, and Miss Prince, who kept a record of the finds, had a total of over 90 phanerogams actually in flower on her list for the day.

The church of St. Mary at Great Parndon was visited, and here the party was received by the newly appointed rector, the Rev. Dr. McCrall. The Hon. Secretary, with the rector's permission, read to the party from Fisher's *Deanery of Harlow*, 1922, an account of the fabric, which was then inspected in detail, the tall panelled stone Font, of late 15th century date, attracting special attention.

Tea was served at the Cock Inn at Great Parndon, after which a formal meeting of the Club was held, with the President, Dr. A. Smith Woodward, in the chair, when Mr. Loughnan Pendred, of *Feltham House, Loughton*, was elected a member, and two nomination forms for membership were read. The President thanked our conductor, Mr. Geoffrey Dent, for his leadership during the day, and for the arrangements made by him for the comfort of the party, and Mr. Dent suitably replied.

A three-mile walk back to Roydon station, in time to catch the 7.5 o'clock train to London, brought to a close a very enjoyable excursion.

GRASS AND SEDGE FORAY AT SEWARDSTONE.

(568TH MEETING).

SATURDAY, JULY 7TH, 1923.

A field meeting for the especial purpose of studying the grasses and sedges of the Forest was organised for this date, and was attended by just thirty members, under the leadership of Miss G. Lister, F.L.S., Miss A. Hibbert-Ware, F.L.S., and Miss E. Prince.

Starting from Chingford railway station shortly after 11 o'clock, the party struck across Chingford Plain into the woodland and speedily became detached into two portions, one portion emerging from the Forest at Ludgate Plain and thence proceeding across the fields to Leppitt's Hill, while the other continued in the thicket until Leppitt's Hill was reached: both parties foregathered for lunch at the "Owl" inn, and joined forces for the afternoon route along the green lanes and "bridle-paths" which form so charming and distinctive a feature of this lovely neighbourhood. A small afternoon contingent started from Chingford at about 2.30 o'clock and joined the main party at the point where Gillwell Lane debouches upon the Sewardstone road.

Collections were assiduously made throughout the day, in spite of the intense heat: as a result, some 31 species of grasses were noted in flower, among the more interesting of which were *Alopecurus geniculatus*, *Avena flavescens*, *Festuca elatior*, *Briza media*, *Glyceria plicata* and *Triodia decumbens*; and seven *Carices* were noted, viz., *Carex glauca*, *C. ovalis*, *C. vulgaris*, *C. hirta*, *C. divulsa*, *C. vulpina* and *C. remota*, and also *Eleocharis palustris*.

The hemlock, *Conium maculatum*, was seen growing handsomely in its

well-known station at Sewardstone, and the Dyers' Green Weed, *Genista tinctoria*, occurred in small quantity by one roadside.

A non-botanical find was a juvenile Little Owl (*Athene noctua*), just off the nest, which was found drowned in a duckweed-covered pond on whose treacherous surface the youngster had apparently sought to alight: this specimen was kindly given to the Club's Museum by the finder, Miss G. Lister.

A welcome opportunity for rest and liquid refreshment was afforded by the fact that Miss Hibbert-Ware's house in Gillwell Lane was on the direct line of route.

Tea was taken at 5 o'clock at Hawksmouth Farm, close to Yardley Hill, in the quaint old timber barn which has become familiar to us on previous excursions.

After tea, a formal Meeting of the Club was held, with Miss G. Lister, F.L.S., Vice-President, in the chair (in the unavoidable absence of our President), when Miss E. A. Horwood, of 199, *Sebert Road, Forest Gate, E.7*, and Mr. J. B. Fidgen, of 151, *Romford Road, Stratford, E.15*, were elected members of the Club.

The Hon. Secretary reported that, following the resolution on the subject of the Walthamstow Reservoirs which was passed at the Maldon meeting on June 2nd, and which was duly forwarded to the Metropolitan Water Board, the President and he had attended as a deputation from the Club before the Works and Stores Committee of the Board on July 4th, when the Chairman of the Committee informed them that his Committee had decided to recommend the Board to abandon the practice of shooting birds on the Lea Reservoirs: he had also received a formal notification to the same effect, as under:

" Metropolitan Water Board,
Rosebery Avenue, E.C.1.
4th July, 1923.

" Dear Sir,

" Shooting of wild fowl on the Board's waters.

" Adverting to previous correspondence which has taken place between yourself and the Board with reference to the above-mentioned subject, and to your attendance as a member of the deputation to the Works and Stores Committee of the Metropolitan Water Board to-day, I have pleasure in formally notifying you that it has been decided, as a result of representations which have been made by your Club and other kindred Societies, to abandon the practice of shooting wild fowl on the Board's Reservoirs.

I am, Yours faithfully,

(Signed) G. FRANCIS STRINGER,
Clerk of the Board.

The Hon. Secretary,

Essex Field Club,

The Essex Museum of Natural History,

Romford Road, Stratford, E.15."

The reading of this communication evoked many signs of satisfaction from members present.

Mr. Thompson also referred to a communication which he had received, in answer to enquiries, from the Chief Inspector of Ancient Monuments, H.M. Office of Works, giving a list of Ancient Monuments in Essex which had

been approved for inclusion in the Schedule of Monuments in pursuance of section 12 of the Ancient Monuments Consolidation and Amendment Act of 1913. He observed with satisfaction that the list included Queen Elizabeth's Lodge, Chingford, and the two Forest camps: other monuments to be scheduled, in which the Club was specially interested, were Nether Hall, Roydon, the Maze at Saffron Walden, and the Bartlow Hills, all of which would thus be saved from desecration or destruction in the future.

A vote of thanks to the conductors closed an interesting meeting, and the party made its way back to Chingford station.

VISIT TO SOUTH BENFLEET AND CANVEY ISLAND (569TH MEETING).

SATURDAY, 22ND SEPTEMBER, 1923.

A party of over 40 members foregathered at Benfleet station shortly before 11 a.m., the principal objects of the field-meeting being to study and collect the salt-marsh plants of the "saltings" and the insect life of the brackish ditches of the island. Before leaving the mainland, however, a visit was first made to the picturesque parish church of St. Mary-the-Virgin at Benfleet: here the party was welcomed by the vicar, the Rev. W. H. Holdsworth, who read a detailed account of the ancient fabric and called attention to its special architectural features. He pointed out that the early Norman west doorway was originally external, as is shown by its mouldings, although now it opens into the massive Tower, which was not added until about A.D. 1390: the same remarks apply to the two Norman windows in the west wall.

Mr. Holdsworth gave the dates of erection of the various existing portions of the church as follow:—

Norman West wall, *circa* 1140.

Early English piers supporting the chancel arch, *circa* 1240.

South aisle, *circa* 1320.

Tower, *circa* 1390.

Clerestory windows in S. aisle, and the magnificent timber Porch, *circa* 1430.

North aisle, *circa* 1420.

Chancel arch, chancel roof and windows, *circa* 1450.

Windows in N. aisle, *circa* 1480 or later.

The eight sculptured stone corbels in the nave-clerestory, which carried the original main roof-timbers (but which support no part of the present roof) are interesting, four of them representing the symbols of the four Evangelists, the other four being grotesque heads. The rood-stair remains in the north aisle.

Leaving the church, the party made its way down to the waterside and was ferried across, in several batches, to Canvey Island. Here it split up into two sections, one going on to the "saltings" and later visiting Canvey village, the other proceeding direct to the village and thence on to the sea-wall at Hole Haven. By 5 o'clock all had left the island and crossed back to the mainland at low water by the stepping stones.

Tea was taken at the "Hoy" inn, at South Benfleet. After tea, a meeting of the Club was held with the President in the chair, when one nomination for membership was read.

The President referred to the death, a few days before, of one of our Members of Council, Sir Thomas Barrett-Lennard, Bart., and proposed that a letter of condolence be sent to Lady Barrett-Lennard: the suggestion was adopted unanimously. Thanks were voted also to the conductors.

The President said that the company was honoured with the presence of Mr. E. E. Green, President of the Entomological Society, and invited that gentleman to speak on the entomological finds of the day.

Mr. Green was followed by Miss Lister, Miss Hibbert-Ware, and Mr. Thompson, who each made some remarks on the observations of the excursion. The more interesting records may be summarised as follows:—

The plants met with on the "saltings" or in the marsh ditches included: *Spergularia neglecta*, *Artemisia maritima* and its var. *gallica*, *Aymeria vulgaris*, *Statice Limonium*, *Salicornia herbacea*, *Suaeda maritima*, *Atriplex patula*, *A. hastata*, *A. littoralis*, *Obione portulacoides*, *Beta maritima*, *Triglochin n. aritimum*, *Juncus compressus* var. *Gerardi*, *Juncus maritimus*, *Scirpus maritimus*, *Glyceria maritima*, *Hordeum maritimum*, and *Lepturus filiformis*. A profusion of *Daucus carota* and *Helminthia echioides* in one field afforded indication of the high lime-content of the alluvial soil of the island (probably due to comminuted shells of *Cardium* and other molluscs).

Among the birds, Meadow Pipits, Yellowhammers, Curlews, Redshanks, Peewits, a Stonechat, Mallards, and a Willow Warbler still in full song were recorded on the excursion, and, in addition, Greater Blackbacked Gulls, Herring Gulls, Blackheaded Gulls, Common Gulls and Ring Plovers were seen feeding on the mud at low tide by members who stayed on the island for the week-end.

Among the insects noted were a single larva of the Essex Emerald Moth (*Euchloris smaragdaria*) feeding on the Sea Wormwood, caterpillars of the Mother Shipton moth (*Euclidia mi*) a large swarm of the beetle, *Aphodius contaminatus* in and flying over horse droppings on a road, and equally large swarms of the dipteran *Ephydra* on *Enteromorpha* covering one brackish-water ditch.

Two isopods, *Idotea tricuspidata* and *Sphaeroma rugicauda*, were found in brackish ditches on the island, and large numbers of the ostracod *Cypridopsis aculeata*.

The return journey to town was made by the 6.30 p.m. train from Benfleet.

FUNGUS FORAY, LOUGHTON TO HIGHBEACH (570TH MEETING).

SATURDAY, 13TH OCTOBER, 1923.

An unexpectedly fine day, following a week of heavy rain, tempted some 130 members and visitors to take part in this annual Foray, which has now become one of the most popular functions of the Club's year; for the second consecutive occasion the Foray was made a joint one of the Club and of the British Mycological Society.

The referees were :—

For the Basidiomycetes and Ascomycetes : Miss Elsie Wakefield, F.L.S., Mr. F. G. Gould, Mr. Arthur A. Pearson, F.L.S., and Mr. J. Ramsbottom, O.B.E., F.L.S. ;

For the Myxomycetes : Miss G. Lister, F.L.S. ;
and the headquarters were, as in former years, at the Roserville Retreat, Highbeach, in Epping Forest.

A morning party, numbering some 60 persons, assembled at Loughton station at 10.41 o'clock, and, passing through Loughton village, entered the Forest at York Hill ; from here the route traversed was by way of Black-weir Hill, the "gravel pits," Great Monk Wood and the Wake Valley and so to Highbeach.

Two separate afternoon parties left Loughton station between 2 o'clock and 3 o'clock, and took the shorter Forest route to Highbeach, via Staples Hill, Loughton Camp, and Little Monk Wood.

By 4 o'clock a goodly number of specimens had been collected, and were on exhibition, duly named, at the headquarters.

Tea was served at 5 o'clock, after which a meeting of the Club was held with the President, Dr. A. Smith Woodward, F.R.S., in the chair, when the several referees gave brief reports on the finds of the day.

Miss Wakefield called attention to the periodicity of fungi, a subject about which very little is known, and she remarked that persons attending field-forays could do valuable work in recording facts of this nature.

Mr. Ramsbottom remarked on the abundance of *Amanita mappa* this autumn, not only in Epping Forest, but throughout the country. He called special attention to a small agaric *Schizophyllum commune*, a single specimen of which had been found growing on a felled trunk that day : this species, rare in this country, has a special adaptation against drought, its gills being split lengthways and the two halves separating and arching outwards so as to enclose and protect the spore-bearing surface in unfavourable times. [This specimen was secured for the Club's Museum. Ed.]

Miss Lister reported that 14 species of mycetozoa had been found during the day ; the recent heavy rains had doubtless washed away many other of these fragile organisms.

The list of mycetozoa is as follows :—

Badhamia utricularis, *B. panicea*, *Physarum nutans* and its var. *robustum*, *Fuligo septica* (in its sclerotium stage only), *Stemonitis fusca*, *Comatricha nigra*, *C. typhoides*, *Cribraria vulgaris*, *Dictydiaethalium plumbeum*, *Trichia varia*, *T. scabra*, *Arcyria denudata*, *A. pomiformis* and *A. cinerea*. *Trichia scabra* was found on decayed beech logs at High Beach forming a layer of some five thousand shining orange sporangia.

The President referred to the happy co-operation of the British Mycological Society with the Club on these occasions ; and welcomed members of the Gilbert White Fellowship, the School Nature Study Union and other Societies, who were present by invitation. He also proposed the cordial thanks of the Club to the conductors and referees, which were heartily accorded by those 'present.

The proceedings then terminated.

Mr. Pearson has since furnished a complete list of the 'fungi met with during the Foray, numbering 184 species and varieties, and including several

interesting records : seven species are now recorded from Epping Forest for the first time, viz. :—

- Lepiota clypeolaria* (Bull.) Fr.
Tricholoma cinerascens (Bull.) Quel.
Collybia tesquorum Fr.
Hebeloma glutinosum (Lindgr.) Fr.
Psalliota xanthoderma Genev.
Hypholoma leucotephrum B. and Br.
Peniophora sanguinea (Fr.) Bres.

THE COMMON POLYPODY IN ESSEX : WHY IS IT DECREASING ?

BY MILLER CHRISTY, F.L.S.

EVERYONE familiar with the flora of Essex is aware that the true ferns (Filices) form an extremely small proportion. It is not so much that the number of species indigenous to the county is particularly limited ; for such is not the case. Gibson enumerates, indeed, no fewer than twenty species as occurring.¹ The point is, rather, that the number of individual plants representing those species is, in most cases, extremely small. Anyone able to compare the fern-flora of Essex with that of Devonshire or any other western county realizes at once the great poverty of our county in this respect. In Essex, we have only one single species which can be described as really abundant—the Common Bracken (*Pteris aquilina*). The Polypody (*Polypodium vulgare*) is, however, quite common, and the little Adder's-Tongue (*Ophioglossum vulgatum*) is fairly so. Devonshire, on the other hand, has at least a dozen species, all of which are more or less abundant.

That the fern-flora of Essex must always have been very meagre, not only comparatively, but actually, is certain ; for Essex, as the driest county in England, lacks that humidity of climate, due to heavy rainfall, which is so necessary for luxuriant fern-growth. Our mean average rainfall is about 23 inches annually : that of Devonshire, about 41 inches, or nearly twice as much. There, the climate is so moist that fern-spores propagate readily every year ; whereas, in Essex (as Mr. Shenstone

¹ *Flora of Essex*, pp. 394-404 (1862).

has pointed out), it is so dry that they propagate in exceptionally-wet years only. As a result, ferns which may be destroyed by agricultural or building operations or dug up intentionally, are replaced by nature very slowly, if at all. This striking difference in the climates of the two counties is amply sufficient to account for the equally-striking difference in their respective fern-floras.

Moreover, it is certain that our fern-flora of to-day, meagre as it is, is very much poorer, in respect of both species and individuals, than it was less than a century ago. The decrease has been very noticeable, even within my own recollection. Considerably less than a century ago, the Royal Fern (*Osmunda regalis*) flourished abundantly in bogs at not a few places throughout Essex.² To-day, I doubt whether even one single plant grows wild anywhere in the county. Or, take such species as the Marsh Fern (*Lastrea thelypteris*), the Mountain Fern (*Lastrea oreopteris*), the Herring-bone Fern (*Blechnum spicant*), and the Black Spleenwort (*Asplenium adiantum-nigrum*). When Gibson wrote, sixty years ago, he was able to name a fair number of localities for each of these species. Yet, to-day, though individual plants may still linger, these are, in most cases, no more than a miserable remnant of those which were to be found then. For instance, in regard to the last-named, the Black Spleenwort, I can remember seeing it not uncommonly in one mid-Essex locality—on the bank of a hedge beside the Parsonage Lane, at Broomfield.³ To-day, that lane is lined by cottages and other buildings, including a Board School, and the plant has long disappeared. Without doubt, there are still localities for it in Essex; but, off-hand, I cannot name even one. Again, when I was a boy, single plants of the Prickly Fern (*Polystichum angulare*) were met with not uncommonly, growing on the banks of ditches in Broomfield, the Chignals, Roxwell, and throughout the district lying to the north-west of Chelmsford, where to-day one seldom or never sees a single plant. Even the common Male Fern (*Lastrea filix-mas*) which used to be fairly common in similar situations and in woods throughout the same district, has become very noticeably scarcer within my own recollection.

² See, for example, ESSEX NATURALIST, xix. (1921), p. 269.

³ I have a note that, on 26 December 1876, I saw "a large quantity" there, together with a few plants of *Polystichum aculeatum*.

The testimony of others is to exactly the same effect. Thus, Mr. Shenstone writes me :—" Our Essex woodlands have been largely cleared of the Male Ferns, Lady Ferns, &c., which were fairly abundant in the woods near Colchester in my early botanical days." Further, Mr. E. E. Turner, who has an unrivalled knowledge of the flora of the Coggeshall district, writes me that the Hart's Tongue (*Scolopendrium vulgare*) " was fairly common there when I was a boy, but I do not remember having seen a specimen for years."

As to the main reasons for the disappearance of these ferns from their old localities in the county, there can be no doubt whatever. That disappearance is due in part to more intensive cultivation and in part (as to those species which grow in bogs) to the steady draining of bogs ; but, more than all else, it is due to gradual eradication by trippers, trade-collectors, gardeners, and others, who dig up roots for removal to their gardens, where, more often than not, they are neglected and quickly die.

Yet one may well wonder whether there is not some other cause also at work—at least in connection with the Polypody, which, though still common, has decreased very markedly indeed in recent years.

When I was a boy, this fern was certainly immensely more abundant in Essex than it is now. In the district already referred to, including the whole of the Roothings and even beyond Dunmow, it was then very common on rotting stumps and among the roots of hedges growing on the banks of ditches, both by the roadside and among the fields. I have in my diary not a few notes to this effect. Thus, on 20th December 1875, I noted it as " immensely abundant—more so than I have ever seen it anywhere else—" on the road-side banks between Chignal St. James and Dunmow. Again, on 30th December 1876, I noted it again as " immensely common " on certain roadside and other banks at Lindsell, together with its varieties *acutum* and *serratum*, and with fronds which were not only bifid themselves, but had also some of their pinnae bifid.⁴ At the same time and place, I also saw it growing on the crowns of pollarded trees, and noted explicitly that " the top of one oak-tree was covered thickly by one root two yards square." Again, on 18th

⁴ Specimens gathered on this occasion are preserved in my herbarium, now in the Club's Museum.

January 1878, I noted that there was "a great deal of *P. vulgare*" on hedge-banks between Chignal and Pleshey. A fortnight later I saw it "very fine, with its vars. *serratum* and *denticulatum*," around Berners (commonly called "Barnish") Wood, at Berners Roothing. To-day, the Polypody is not only infinitely less common than it was throughout the whole of that district: it may even be described as scarce there—a fact to which I can testify as a result of a cycle-trip I recently (September 1922) made through most of the Roothing parishes.

Similar evidence comes from other parts of the county.

In the early part of last century, the Polypody grew very abundantly in Epping Forest, chiefly on the crowns of the old pollarded hornbeams and oaks, which were often most picturesquely crowned and festooned by it. Edward Newman wrote in 1840⁵:—"In Epping Forest, I have often seen it ornamenting, with its bright green fronds, the heads of the pollarded hornbeams, when the wintry blast has stripped them of their summer verdure." My own acquaintance with the Forest (particularly that part lying north of Epping, including Wintry Wood) extends back to 1869. I was then quite a small child, but I can remember very distinctly the masses of fronds of Polypody which then covered the crowns of many of the trees, especially in that part of the Forest indicated.⁶ But go there now and see how many trees are still festooned in this way. Peradventure there may be a couple of dozen!

The same thing has occurred in the extreme north-east of the county. Mr. J. C. Shenstone writes me:—"When I began to study the Essex flora in 1875, one found Polypody abundant under the shadow of oak trees growing in hedgerows on sandy tracts in the vicinity of Colchester. I can recall several colonies beside roads in Tendring Hundred, others between Colchester and the Blackwater, as well as others elsewhere. When I left Essex in 1907, these colonies, if not extinct, had become sadly depleted."

Now why should the Polypody in particular be disappearing in this way? The reasons given above for the disappearance or decrease of other ferns seem applicable to it to a small extent only; for it does not grow in bogs which are liable to be drained

⁵ *British Ferns*, p. 32 (1840); 2nd ed., p. 110 (1844); 4th ed., 1865, p. 61.

⁶ I have never seen it flourishing so greatly on trees elsewhere, except in Parham Park, Sussex, on 26 April 1879.

and, as it is not grown largely in gardens, it is less likely than some other ferns to be uprooted and carried away by ordinary trippers, who, in any case, are little given to tree-climbing.

So far as Epping Forest is concerned, it is probable that the decrease of the Polypody may have been due, to some extent, to systematic raids by trade collectors ; for Francis G. Heath, writing in 1875, says⁷ that " No fern is so plentifully vended in the London streets as our Polypody ; for Epping Forest—that delightful strip of greenwood—furnishes the plant in thousands." The same thing certainly went on elsewhere in the county also ; for Mr. Shenstone tells me that, years ago, when the cultivation of ferns, both indoor and on rockeries, was a special vogue, he often saw roots of Polypody, dug from ditches and hedge-banks in the vicinity of Colchester, offered for sale by vagabond hawkers in the streets of that town.

Still, with my recollection of the former abundance of the Polypody in Epping Forest, it is difficult for me to think that even an army of these malefactors could possibly have reduced the plant to its present limited numbers there. Moreover, in regard to the Roothings, it is quite certain that such folk cannot possibly have played more than an altogether inconsiderable part in exterminating the Polypody from those parishes, which are still away from the main roads, entirely rural, agricultural, and remote. It is impossible to suppose that predatory hawkers can have threaded their deep muddy lanes and crawled along the ditches between their quiet and equally-muddy ploughed fields in sufficient numbers to effect the extraordinary reduction in the number of the Polypody plants which has taken place there.

Turning again to Epping Forest, one might surmise that the super-abundant London smoke, which is credited with having greatly reduced the lichen-flora of the Forest, might have had the same effect on its fern-flora ; but this seems improbable on the face of it. Moreover, this cause could hardly account for the simultaneous disappearance of the plant from the Roothings, which are certainly outside the immediately-devastating effects of London smoke.

In the case of the Polypody, therefore, it seems clear that

⁷ *The Fern Paradise*, p. 189 (1875).

there must be *some special cause, of a general nature*, to account for its very marked decrease throughout Essex ; but it is not easy to perceive just what that cause may be.

In the case of the Roothings, there can be little doubt that the clearing away of old tree-stumps and the cutting down of hedges (now customary to a very much greater extent than formerly, as a result of modern agricultural methods) is to a large extent accountable for the decrease. Yet it is impossible to suppose that this can have been the sole cause ; and, in any case, this cause cannot have been accountable for the decrease of the Polypody in Epping Forest. A steady decrease in rainfall during the last fifty years or so might easily account for the general decrease of the fern throughout the whole county ; but, so far as I am aware, no such decrease of rainfall has been recorded.⁸

Why, then, has the Polypody decreased so remarkably in Essex ? I confess myself at a loss to explain it.

⁸ Mr. Chancellor's observations from 1868 to 1903 (ESSEX NAT., xii. (1903), pp. 248-250) show no such decrease.

END OF VOL. XX.

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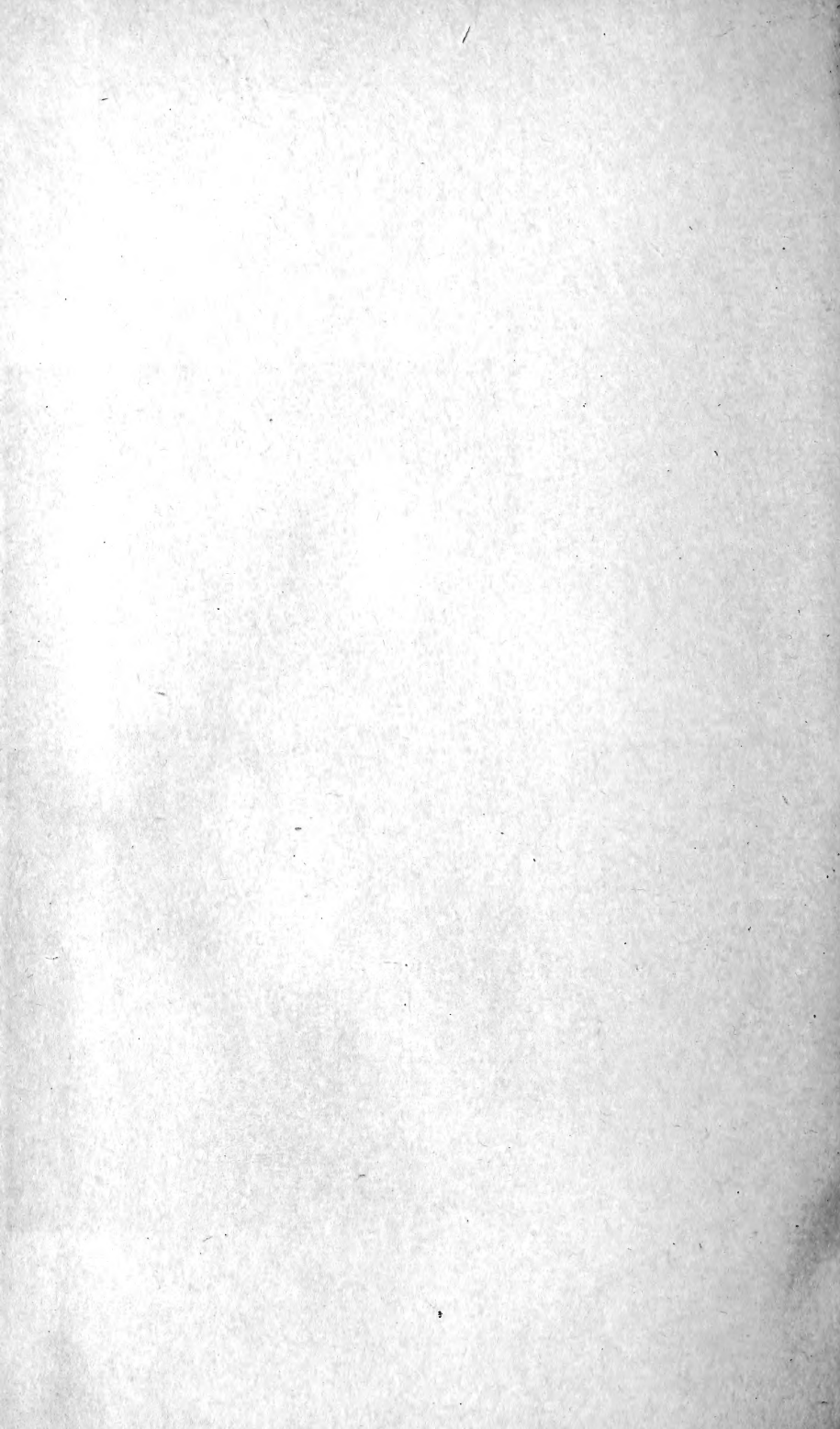
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